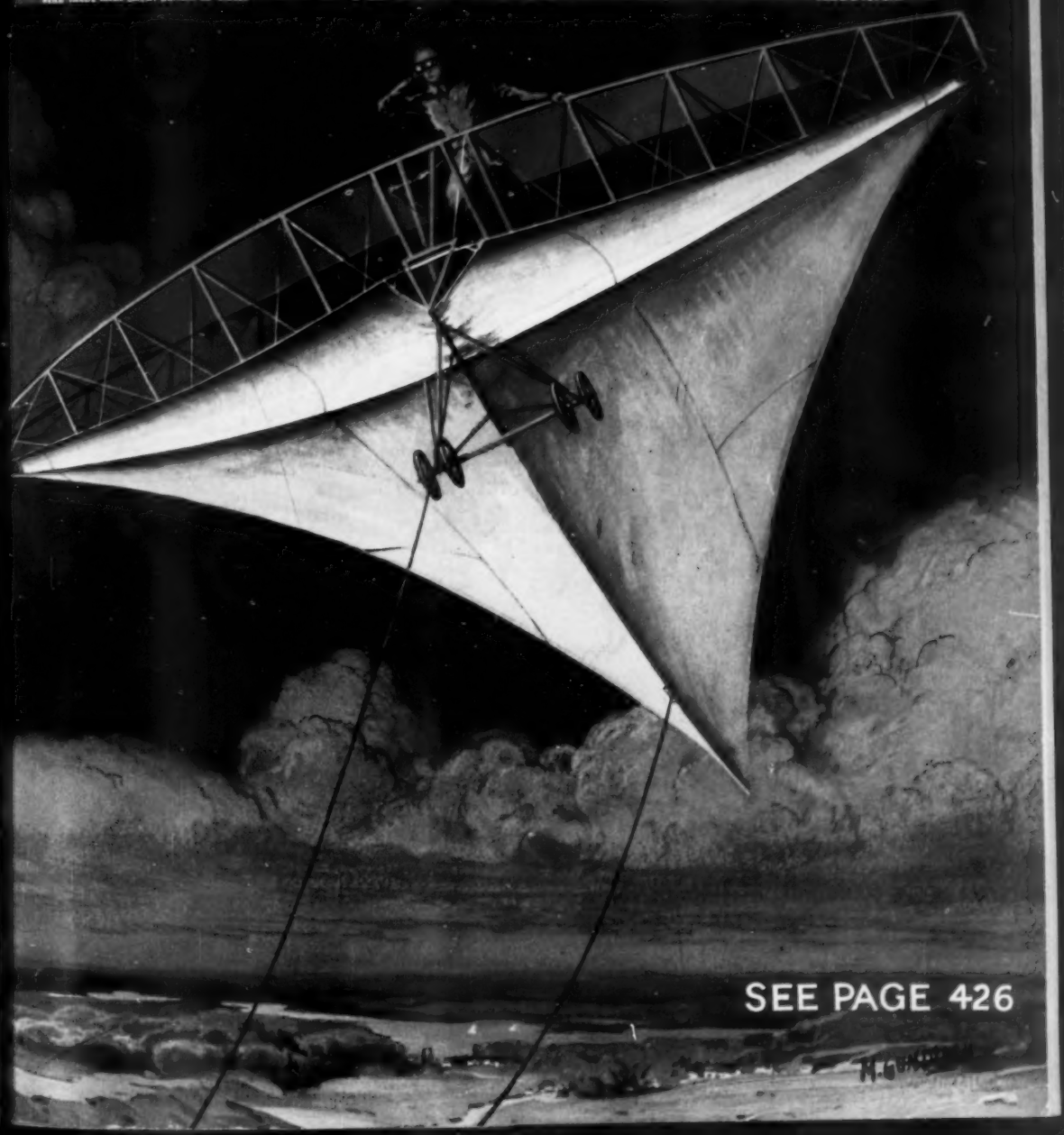
RCH

25 CENTS

FEB 8 1927

POPULAR MECHANICS MAGAZINE

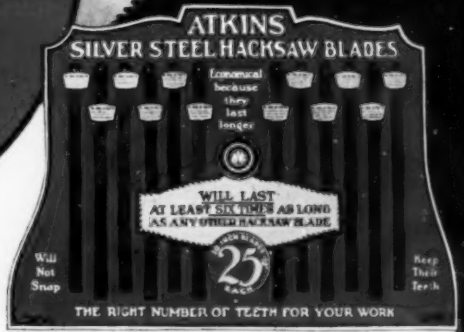
WRITTEN SO YOU CAN UNDERSTAND IT



SEE PAGE 426

ATKINS SILVER STEEL SAWS

Cut Six Times More Metal


ATKINS
SILVER STEEL HACKSAW BLADES
Economical because they last longer
WILL LAST AT LEAST SIX TIMES AS LONG AS ANY OTHER HACKSAW BLADE
25
Will Not Snap
Keep Their Teeth
THE RIGHT NUMBER OF TEETH FOR YOUR WORK

ATKINS SILVER STEEL MADE IN U.S.A.

Mr. Happy Man Says—

"See These

New Hack Saw Blades at Your Hardware Store"

NOW—At YOUR Hardware Store—You can get the wonderful NEW Atkins Hack Saw Blades of "Silver Steel" for hand use.

Actual tests show these NEW blades cut SIX times longer than any ordinary hack saw blade. They hold their edge better—cut quicker and easier—save you time, money and material.

It pays to be sure the name **ATKINS** is on the blade. Atkins leads in saw development. Look for the counter display shown above—*At Your Hardware Store.*

If your dealer cannot supply you, tell us what kind of metal you are cutting, enclosing 25c, and we will send you a sample "SILVER STEEL" blade.

E. C. ATKINS & CO., Est. 1857, 426 So. Ills. St., Indianapolis, Ind.

Leading Manufacturers of Highest Grade Saws for Every Use; Saw Tools, Saw Specialties, Plastering Trowels and Machine Knives

NEW!
Eveready Layerbilt "B" Battery No. 486, the Heavy-Duty battery that should be specified for all loud-speaker sets.
EVEREADY
RADIO "B" BATTERY
Layerbilt
NATIONAL CARBON CO. INC.
The Layerbilt patented construction revealed. Each layer is an electrical cell, making automatic contact with its neighbors, and filling all available space inside the battery case.
DIFFERENT!

For greatest economy all loud speaker sets require the new Eveready Layerbilt "B" Batteries

IT WILL pay you, in convenience and reliability as well as in dollars and cents saved, to use this remarkable battery.

The reason for the Eveready Layerbilt's surprising performance lies in its exclusive, patented construction. No other battery is like it. It is built in flat layers of current-producing elements, making practically a solid block. The layers make connection with each other automatically, and occupy all available space inside the battery case. Layer-building packs more active materials in a given area, and makes those materials produce more electricity.

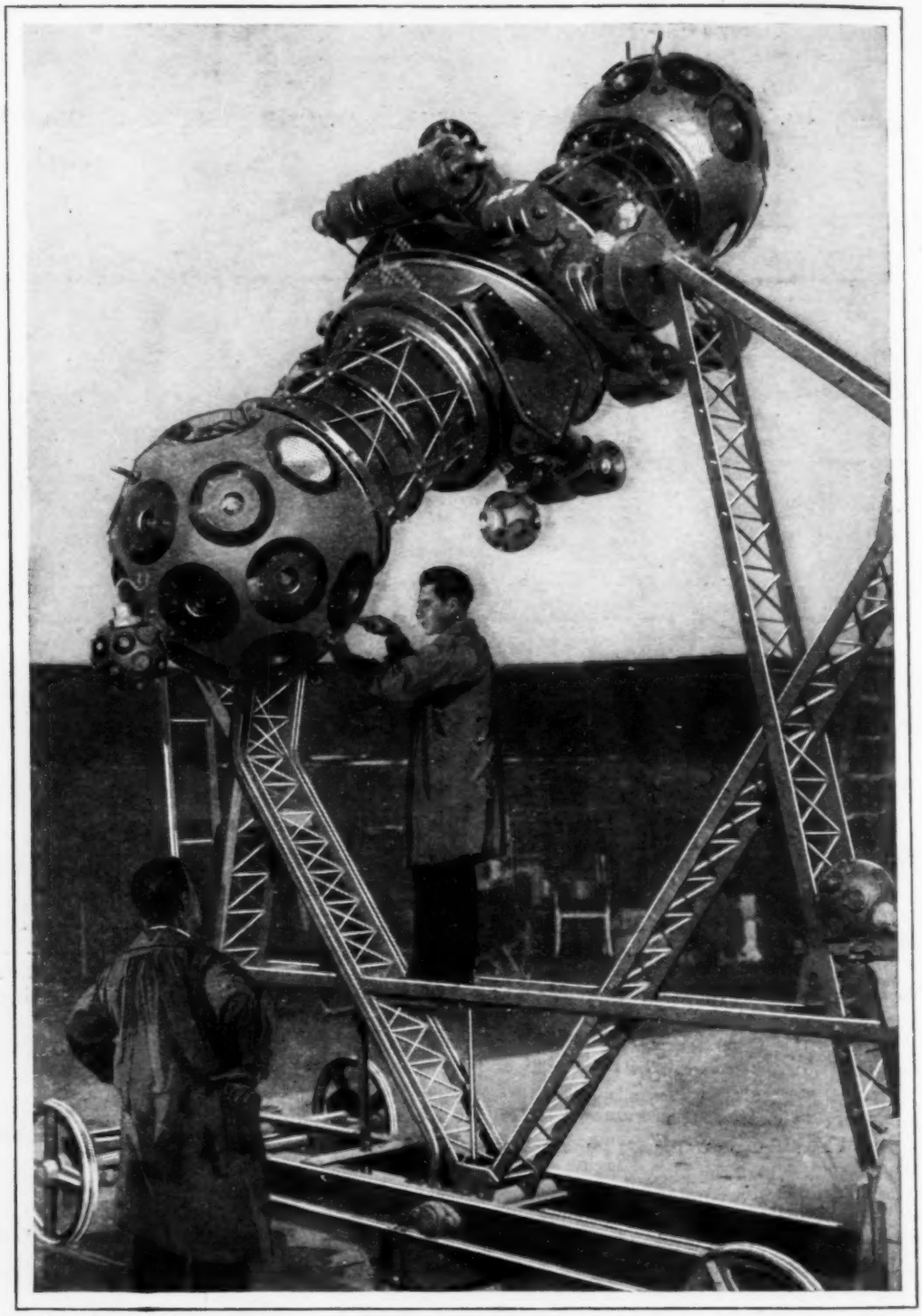
Every loud-speaker set should use Heavy-Duty batteries, for they alone offer economy on modern receivers. When you buy new "B" batteries be sure to get the Heavy-Duty size, and remember that the Eveready Layerbilt has proved to be the longest lasting, most economical of all Heavy-Duty batteries.

Our laboratories are continually testing batteries and in all our tests we have yet to find a battery that is equal to the new improved and radically different Eveready Layerbilt "B" Battery No. 486. The development and perfecting of this remarkable battery is an outstanding battery-building achievement. It is the result of many years' experience plus the facilities and resources of the pioneer manufacturers of all dry cell batteries.

NATIONAL CARBON CO., INC.
New York San Francisco
Unit of
Union Carbide and Carbon Corporation

Tuesday night is Eveready Hour Night—9 P. M., Eastern Standard Time

WEAF—*New York*
WJAR—*Providence*
WEEI—*Boston*
WTAG—*Worcester*
WFI—*Philadelphia*
WGR—*Buffalo*
WCAE—*Pittsburgh*
WSAI—*Cincinnati*
WTAM—*Cleveland*
WWJ—*Detroit*
WGN—*Chicago*
WOC—*Davenport*
WCCO—*Minneapolis & St. Paul*
KSD—*St. Louis*
WRC—*Washington*
WGY—*Schenectady*
WHAS—*Louisville*
WSB—*Atlanta*
WSM—*Nashville*



A Modern Magic Lantern That Reproduces Thousands of Stars and the Whole Solar System on a Dome, to Show the Movement of Heavenly Bodies

Popular Mechanics Magazine
REGISTERED IN U. S. PATENT OFFICE
WRITTEN SO YOU CAN UNDERSTAND IT
Vol. 47 MARCH, 1927 No. 3

"HELLO LONDON!" Phone Spans Atlantic

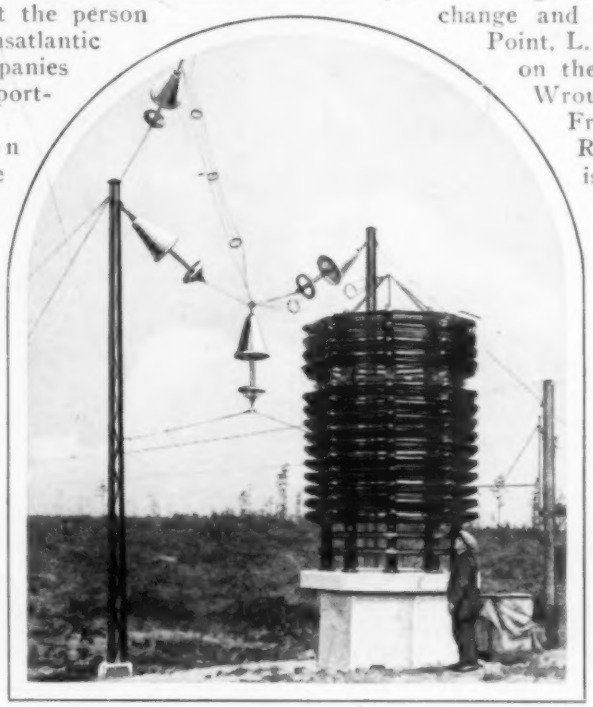
WHY an American says "Hello" when he picks up his telephone receiver, whereas an Englishman usually opens the conversation with "Are you there?" became an international question early in January, when regular transatlantic radio-telephone service was opened between New York and London.

With the new service, every subscriber in New York can telephone anybody in London over his own house or office phone connection—provided he is willing to pay the price. The long-distance rate to London is $75 for the first three minutes or any part thereof, and $25 for each additional minute. And if the connection is established but the person is not in, the transatlantic telephone companies charge $10 for reporting that fact.

Engineers on both sides of the Atlantic have been in more or less regular communication since 1923, but it was not until a few weeks ago that the companies were ready to announce the service to be sufficiently reliable for general use. It still is necessary to allow for atmospheric interference by remitting the charge for any time the connection may be interrupted. For the present the service will be in operation from 8:30 a. m. to 1:00 p. m. New York time, which corresponds to 1:30 p. m. to 6:00 p. m. in London, that being the only part of the day when the business hours of the two cities coincide.

Unlike the usual telephone line, where both parties talk back and forth over the same wire, the first transatlantic telephone employs two routes, separated at places by many hundreds of miles, though both sides of the conversation are carried on the same wavelength. When the New York subscriber speaks to London, his voice passes through the telephone exchange and down to Rocky Point, L. I., where it goes on the air bound for Wroughton, England. From New York to Rocky Point, there is seventy miles of land wire; then a 3,300-mile jump through the air across the sea, and a final land wire trip of ninety miles from Wroughton to London.

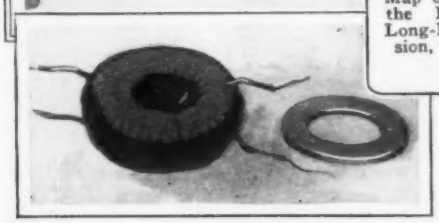
As the Englishman starts to reply, the apparatus is automatically switched and his voice goes northwest from London eighty-five miles by land wire to



Where American Words Take the Air; the Outdoor Tuning Inductance at the Rocky Point Transmitting Station on Long Island

Ten-Kilowatt Radio Broadcasting Tube and a Vacuum Repeater Tube Used to Relay Conversation over Wires for Long Distances

Map of Atlantic Phone Service; the Loading Coil for Long-Distance Transmission, and Early Phone



Rugby, where it is broadcast to be picked up 2,900 miles away at Houlton, Me., and sent on the final lap, 600 miles down the coast, to New York city. The switching on and off of the two circuits, done automatically as one talker stops and the other begins, permits the company to economize in ether space by using a single wave band for both sides of the conversation, instead of two separate bands, as would otherwise be necessary.

Telephone girls at both terminals of the service were specially picked for having the voices most suitable for radio transmission, with low steady intonation, so as to avoid excessive variation in the frequency of the sound waves. They were then taught the names of the different exchanges in the city at the other end, and given lessons in the way ordinary calls are handled abroad, so they would be familiar with the procedure of setting up the connection overseas.

For customers, the telephone engineers advise that talk across the Atlantic should be carried on in quiet, even tones, without shouting, and in the well-modulated voice used in conversation with a person in the same room.

London may be placed in telephonic communication with Australia, South Africa and Canada within a few weeks, and at a much cheaper rate than that charged for the New York calls, owing to the fact that the Marconi short-wave beam apparatus is available, instead of employing the long waves, as is done on the present transatlantic service. Experimental telephone calls to Canada, a distance of 3,000 miles, have been carried on for some time, and occasional successful experiments have been made in reaching Australia, a distance of 12,000 miles from London. Eventually it is intended to link every part of the empire with the British isles.

HIGH-SPEED ELEVATED ROAD FOR AUTOMOBILES

Courtesy the London Motor

Artist's Drawing of New York's Proposed Four-Mile Elevated Motor Road from the Canal Street Docks up Eleventh Avenue toward Riverside Drive

Model Cathedral Fashioned with Pocketknife and Scrollsaw; Figures of Apostles in Center

SEVEN-FOOT CATHEDRAL MADE OF OVER THOUSAND PIECES

Tiny chimes play eight different tunes, the hours are tolled and the figures of four Apostles march slowly through a curtained door as the music sounds in an electric-lighted model cathedral, seven feet high. Pocketknife and scrollsaw were the principal tools used in fashioning the model, which contains 1,080 pieces of wood of sixteen different kinds, painted in twenty-seven various shades and colors. The model was finished in about nine months, the designer devoting only his spare time to the task.

ANCHOR FOR AIRPLANE CARRIER WEIGHS FIFTEEN TONS

To hold fast the navy's aircraft carriers, anchors weighing fifteen tons have been ordered. This is in keeping with an axiom of the sea that for every ton of ship, there should be a pound of anchor. Tests are being made with a type of stockless anchor which is said to provide greater holding power without a corresponding increase in weight.

TINY ANIMAL WITH BIG BRAIN FOUND IN OCEAN

Too small to be seen by the unaided eye, a tiny animal discovered in ocean water has a nerve center or brain more complex than that of the bee and it can build a new house for itself in less than two minutes, according to Arthur S. Campbell, of the University of California. This creature is found by the million but is so delicate that it dies in twenty or twenty-five minutes after being taken out of the water. Little has been known of it except through its shell, discovered in the stomachs of larger organisms.

MOUTH ORGAN AND HARP IN ONE LATEST MUSICAL NOVELTY

Players of harmonicas can produce their own accompaniment on a novel instrument on which a California inventor has applied for a patent. The mouth organ is inserted in a slot on the harplike part of the outfit, and its tones issue from the sound hole, blending with those of the strings. Cords are played with the aid of keys, the fingering being simple. The instrument is said to be suited especially for accompanying a human voice and, with it, two persons can achieve most of the effects of a five-piece orchestra.

Playing the Combination Harp and Mouth Organ; Note the String Keys for Left Hand

SECRETS OF ORIENTAL ART REVEALED BY SCULPTOR

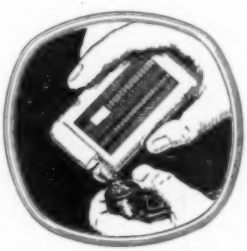
Allan Clark at Work on One of His Painted Wooden Heads, Modeled in Oriental Style; Below, His Orientalized Head of Galli-Curci

Something new in sculpture, introducing bizarre color effects, has been brought back from the orient by Allan Clark, a young American sculptor who spent three years in the Far East. He not only uses inlays of different-colored woods, but employs lacquers and gold leaf to get unusual effects. In a bust of Mme. Galli-Curci he carved the work from mahogany and finished it in black and red lacquers and gold leaf, while the face itself is done in an unusual olive tint. A large comb is finished in red lacquer and a Chinese shawl, draped over the diva's shoulders, is done in green, blue and gold, the colors of the original. The oriental effect not only is carried out in the decorative colors, but the head and face itself are given a distinctly Chinese treatment. While in the orient with the China expedition from Harvard, Clark visited the ancient cave temples there, spent much time with the actors of Japan, studying their stage costumes and effect, and also made studies of old inlay work in Java, Korea, Siam, Tibet and Burma.

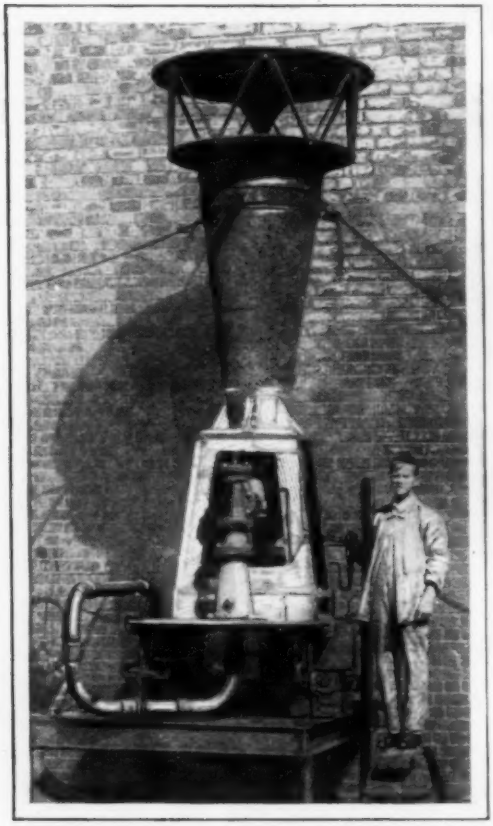
CAGED WOLF GETS EXERCISE BY JUMPING FOR MEALS

To give a timber wolf in a Texas zoo sufficient exercise, park officials have installed a pole upon which the animal's meal of raw meat is placed, just high enough to necessitate expert jumping before the wolf can capture it. Walking about the cage does not give the animal sufficient exercise for the muscles on its back and shoulders, the keepers say, to keep it in good physical condition. The lack is supplied by the daily jumping.

VEST-POCKET TOBACCO CASE REDUCES WASTE



Holding a day's supply of tobacco, an attractive metal case fits the vest pocket and has a double lid, one affording a small aperture through which pipe or cigaret paper may be filled without spilling. To replenish the carrier, both lids are opened.



Fog Horn That Produces the World's Most Terrible Noise and Can Be Heard Forty Miles

TERRIFYING MAN-MADE NOISE TO SAVE SHIPS IN FOGS

A new type of fog horn, whose makers boast that it produces the most terrible noise ever heard, is being installed in Brtish and Canadian lighthouses to save ships from destruction. Some idea of what the noise of the fog horn is like may be gained from the fact that one installed at Cape Race, Newfoundland, has been heard forty miles out at sea. The giant horn, which is operated by compressed air, is called a diaphone.

WIRES HUNG FROM BALLOONS TO TRAP AIRPLANES

Experiments are being conducted by the United States army on a balloon-and-wire plan for protecting cities and other areas from airplanes. The balloons are to be sent to altitudes of several thousand feet, and from each, strands of small steel wire of great strength are suspended. The wires are intended to tangle airplane propellers and other parts, causing the craft to fall, and are so fine that they are invisible beyond a short distance.

WILD DUCKS CAUGHT BY HAND ON BAITED BOX

Mexicans along the Rio Grande have devised a clever scheme for catching wild ducks that alight where the river is not too deep. A hollow box, with holes punched in the top to hold ears of corn or other grain, is placed on the water. A Mexican dives beneath it and stands with his head hidden from view by the floating and apparently harmless box. When a duck alights for the bait, the hunter sticks his hand from beneath and grabs the bird. Game wardens declare that one man can catch as many as fifty ducks in one day by this method.

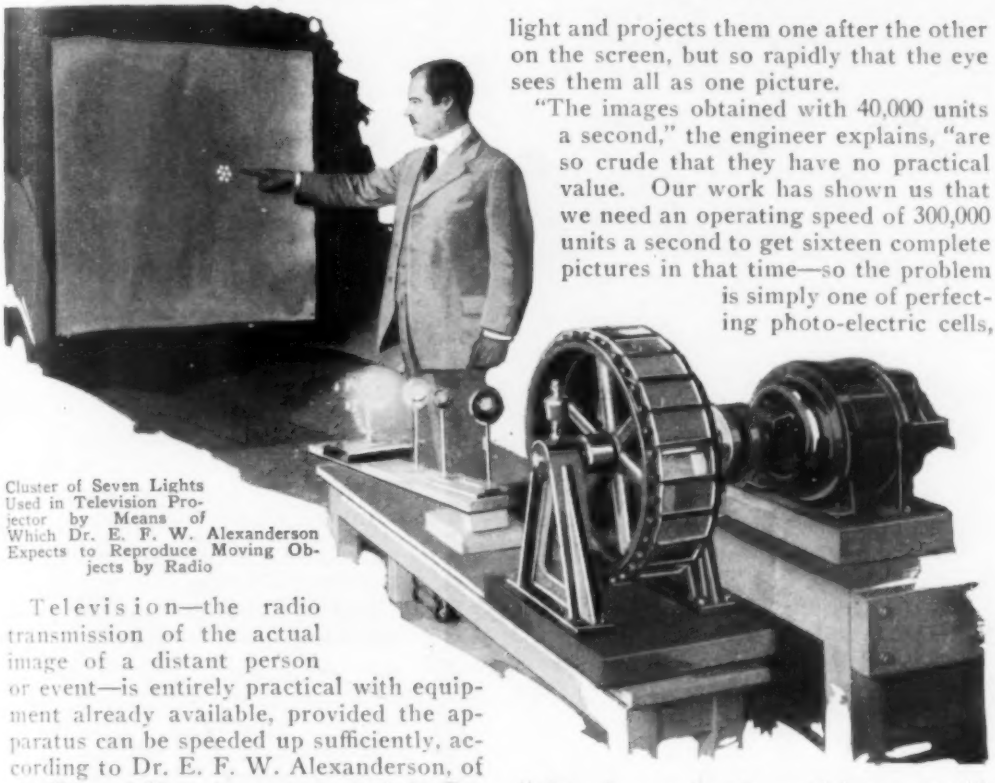
TRIPLE-GAFF HOOK FOR BIG FISH PREVENTS ESCAPE OF CATCH

Devised especially for ice or still fishing, a triple hook, easily attached to any line, securely traps the fish and holds it until landed. The hooks are self-adjusting for various sizes of fish and not only prevent escapes but also protect the line

Fish in Gaff, Showing How the Three Hooks Close about Head near Gills

from breaking. A slip loop holds the gaff any desired distance above the baited hook.

HOPE OF SEEING BY RADIO BROUGHT NEARER FACT



Cluster of Seven Lights Used in Television Projector by Means of Which Dr. E. F. W. Alexanderson Expects to Reproduce Moving Objects by Radio

Television—the radio transmission of the actual image of a distant person or event—is entirely practical with equipment already available, provided the apparatus can be speeded up sufficiently, according to Dr. E. F. W. Alexanderson, of the General Electric company and the Radio Corporation of America. He estimates that it will take about ten years, however, to bring television to the point where it will render a useful public service.

The problem is entirely one of speed. In his laboratory he has transmitted a radio picture in two minutes, as compared with the ten or more minutes taken only a year or so ago. But before movies, or an image of an actual event, can be transmitted satisfactorily, each separate picture must be painted on the screen in one-sixteenth of a second, the same rate at which a movie projector operates in flashing the pictures on the screen.

"It is easy enough to design a television system that will transmit something like 40,000 picture units a second," Dr. Alexanderson says. A picture unit is one of the parts in which a picture is divided for transmission, the photo-electric cell sending each unit as a separate electrical impulse, while the receiving apparatus, a light valve, turns the impulses back into light and projects them one after the other on the screen, but so rapidly that the eye sees them all as one picture.

"The images obtained with 40,000 units a second," the engineer explains, "are so crude that they have no practical value. Our work has shown us that we need an operating speed of 300,000 units a second to get sixteen complete pictures in that time—so the problem is simply one of perfecting photo-electric cells, light valves and radio modulators capable of transmitting impressions at that rate.

Dr. Alexanderson's projector is unique in that he utilizes seven separate lights, instead of a single one. Each of the seven lights scans the picture, and paints a crude image of what it sees, but the lights are so arranged that all their beams converge, and blend so that they produce an optical illusion of a single picture, with the seven parts fused into one good image.

In his experiments he has found a way to eliminate static interference with picture transmission by introducing a "threshold valve" into the circuit, so that nothing is received unless the signal strength exceeds the current value fixed by the valve.

When radio-picture entertainments arrive, however, he suggests that static, fading and other transmission difficulties may be overcome by what he describes as "brute force," which is simply the linking up by wire of many radio stations to supply sufficient power for good results.

THREE-WHEELED CAR RUNS EIGHTY MILES AN HOUR

Tricycle Auto Which Develops High Speed and Saves Fuel, Running Forty Miles on a Single Gallon of Gasoline

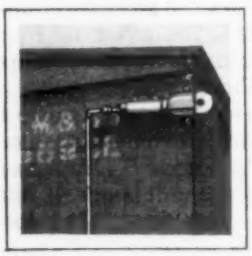
Forty miles on a gallon of gasoline is the record made by a three-wheeled automobile owned by a New York woman and said to be the first of its kind introduced in this country. It has a two-cylinder motor and develops a speed of nearly eighty-five miles an hour.

PEARLS ARE GROWN ON FARMS FROM EGG OF PARASITE

On display recently in a drug-store window in Little Rock, Ark., were 2,000 pearls produced at a river farm near by, where the gems were grown for the market. They were raised from tiny seed pearls transplanted from a mussel into another bivalve. The seed is formed, not around a tiny grain of sand, as is widely believed, but around the minute egg of a certain kind of water parasite. Pearls cannot be produced in all waters because this parasite is not found everywhere, according to a pearl expert. After the seed has been transplanted, seven years are required before the pearl is ready for gathering. The transfer operation is a delicate one. If the seed is placed too near the edge where the shells of the mollusk come together, it will be cramped and ill-formed. If two seeds are too close together, a slug will result, caused by the pearl-producing material growing over both. The substance is deposited in layers, one each year. When pearls are peeled, this structure is apparent, as the material breaks where the year's growth begins. The mollusks can push themselves about with a sort of foot which protrudes from their shell, but their speed scarcely exceeds a few inches an hour. If they become too active, a wire fence is sometimes placed around their beds to restrain them. In all, there are some 110 variations in the luster and color of the pearls so that grading is an exacting task.

SAFETY AIR-BRAKE INDICATOR TO HELP PREVENT WRECKS

For railway trains and street cars, a western inventor has devised an indicator which tells if the air brakes are not working. It consists of a signal, attached to the end of a freight or passenger car, and is so adjusted that, when the air is applied, it protrudes from a housing and shows the engineer or other members of the crew that the brakes are responding properly. If there is a defect, the signal will not appear. The visibility of the signal and its simplicity have led to its approval by the mechanical departments of several roads.



MANY EARTHQUAKES THIS YEAR SCIENTIST PREDICTS

Earthquakes will shake the world in many places during 1927, according to the predictions of Raffaele Bendani, an Italian scholar whose forecasts of such occurrences have attracted wide attention in past years. Southern Europe, Central America, particularly in the isthmus region, and the Greek archipelago, will be visited by temblors early in the year, he declares, while the summer will witness disturbances in Japan, Mexico, the Pacific coast not far from regions visited in 1909, and in the central Mediterranean area. During the second half of the year, earthquakes will be registered in the Antilles as well as the Philippine and Aleutian islands and the southern coast of Alaska, Bendani predicts. Also, volcanic eruptions will take place in Central America and central Asia, he believes.

PICTURES IN COLORED ICE RIVAL BEAUTY OF STAINED GLASS

Lacking snow for building houses and men, Chicago school children found a sport even more amusing in making beautiful windows of colored ice. Upon panes of ordinary glass, little walls of putty were

Colored-Ice Design on Pane of Glass

fastened to make the designs and into the spaces thus marked off, mixtures of cold-water dyes in different colors were poured. After freezing, a firm, transparent "window" was formed. The crystalline structure, visible when the pane was held to the light, added to its beauty.

Entrance to Palatial California Home, Showing the Imported Spanish Door Which Cost $5,000

FIVE-THOUSAND-DOLLAR DOOR IN CALIFORNIA CASTLE

Castles in Spain, or at least parts of them, are being brought to America to beautify homes here. One of the features of a residence near San Diego, Calif., is the mahogany door which was imported from Spain at a cost of $5,000. The dining table was also brought from an old Spanish castle. Moorish and Norman designs have been incorporated in the structure as well as more modern notes, such as the pipe organ back of a loft above the huge fireplace. Ornamental light brackets at the door add to the beauty of the entrance.

HOBOS CAUSE OF HOT BOXES ON RAILROAD CARS

Vagrants cause the railroads various troubles, but one of the most serious and yet least known is their contribution to hot boxes and consequent delays to trains. This they do by removing the waste from the journal boxes to make fires. The material provides a lasting, hot blaze and is often stolen while trains are in the yards or on the sidings

SKATERS PRACTICE ON PLANKS FOR WINTER SEASON

To keep in training for the ice-skating season, German experts practice in a plank-lined trench which has a turf bottom to break the force of falls. The boards are smooth and slant at an angle to give effective drill in balancing and movement.

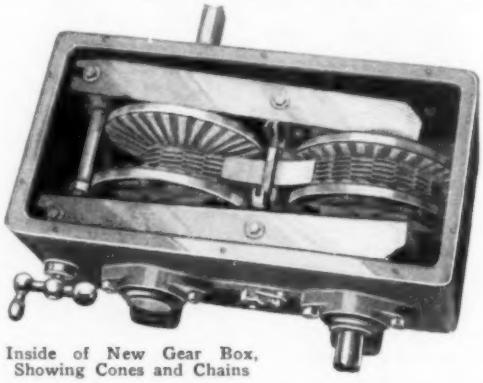
Skating Lessons in Summer on Slippery Planks

NAVY'S RADIO STATIONS GUIDE EIGHTY THOUSAND SHIPS

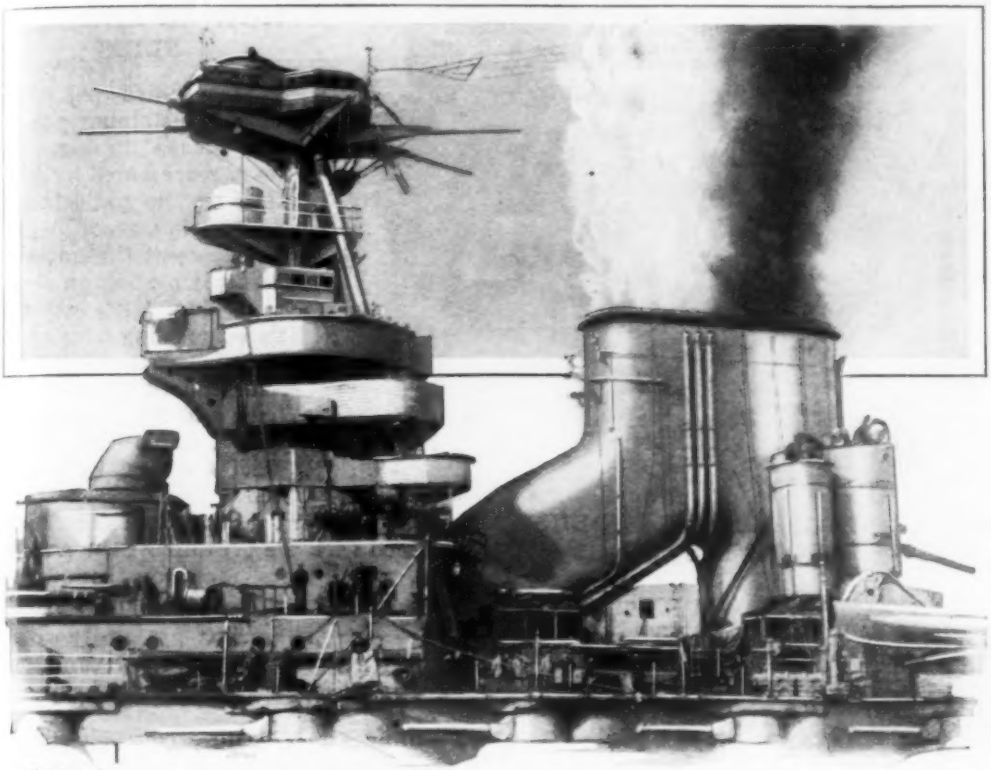
An outstanding example of the remarkable growth of wire and wireless communication is seen in the service rendered by the United States navy. Fifteen years ago, the headquarters office in the navy department was manned by one telegraph operator who stood only one watch of eight hours daily, assisted by a part-time messenger. Today, the staff numbers 139, including skilled land-wire telegraphers, radio operators, communication traffic specialists, accountants and executives, who maintain reliable service with vessels anywhere on the seas. Last year, more than 14,000,000 words were handled. Of this number, nearly 5,000,000 were for other branches of the government, weather reports, market quotations, financial matters, and the like, resulting in a saving of about $850,000. In one year, 83,171 vessels were furnished a total of 184,206 directional radio bearings by the navy's fifty-six radio-compass stations located on both coasts. This service was furnished American and foreign vessels alike, and doubtless prevented many disasters. Among recent outstanding achievements of the department are the efficient radio communication with the MacMillan and Amundsen polar expeditions and the international ice-patrol reports. The service is now being amplified by broadcasting weather maps to ships.

CAR SPEED CHANGED WITHOUT STEPS BY CONE GEAR

A type of gear box, developed in England, gives a continuous range of speed changes without the steps or stops incident to the shifting of gears of the usual type. Both the driving and the driven shaft have two cones, with ridge-like teeth on the inner side, which engage the side sliding laminations of a driving chain. The distance between the cones on each shaft is variable, so if they are held close together the chain is forced up to the edge of the cones, while if they are spread apart the chain slips down toward the center. A screw device with two arms, working on the same principle as a carpenter's clamp, takes care of the adjustment of the cones, forcing one pair together while allowing the other pair to spread apart, or vice versa. The speed range, from a step down to a step up, is limited only by the size of the cones. A reverse gear is incorporated if desired.



Inside of New Gear Box, Showing Cones and Chains



© P. & A.
British Ironclad "Warspite" and Its Double Funnel; This Arrangement Affords More Room for the Conning Tower Which Also Presents Several New Features

TWO-IN-ONE WARSHIP FUNNEL LATEST NAVAL STYLE

One of the most noticeable features of the British warship "Warspite" is its new type of funnel, a single opening being provided for two smokestacks. The plan is said to give reduced visibility at long range, thereby helping to protect the ship from gun fire.

USE OF ELECTRICITY IS DOUBLED IN FIVE YEARS

That the present is rightfully called the electric age is apparent from government reports showing that during the five years between 1920 and 1925, the consumption of electricity throughout the country increased by fifty-one per cent and in some states as much as eighty-five per cent. In actual increase, the middle Atlantic states were ahead with 5,950,000,000 kilowatt-hours, while the increase for all the states was 22,315,000,000 kilowatt-hours. Other sections showing high increases were the east north central with seventy-eight per cent, the west south central with seventy-nine per cent and the Pacific states, where the increase amounted to fifty-eight per cent.

GARAGE FLOORS KEPT CLEAN WITH GREASE ABSORBENT

Oil and grease are said to be removed quickly from the garage floor with the aid of an absorbent material now on the market. It is scattered on the spot, pressed into the oil and then swept up, leaving the floor clean. The substance is noncombustible and may be used several times until saturated.

Recording Instrument on Table at Rear Registers Warmth of Girl's Blush

METER THAT MEASURES BLUSH TO IMPROVE BUILDINGS

Engineers interested in the proper warming and ventilating of buildings have developed a heat meter which is so sensitive that it will record the effect of a blush. The instrument is being used to determine factors in heat transmission and is expected to afford data for better building.

FENCE IS BUILT FOR DAY ONCE EVERY SEVEN YEARS

For just one day, every seven years, a fence is erected around a small triangular plot of sidewalk in front of a large office building in Atlanta, Ga., in accordance with the state property laws. They provide that land used for public purposes for seven entire years at a stretch becomes the property of the public. This particular piece is privately owned and to prevent its becoming part of the public's possessions, it is fenced off for one day, defeating the letter of the law and preserving the owner's title. A brass plate in the walk bears the inscription "private property."

HOW AN AIRPLANE FLIES

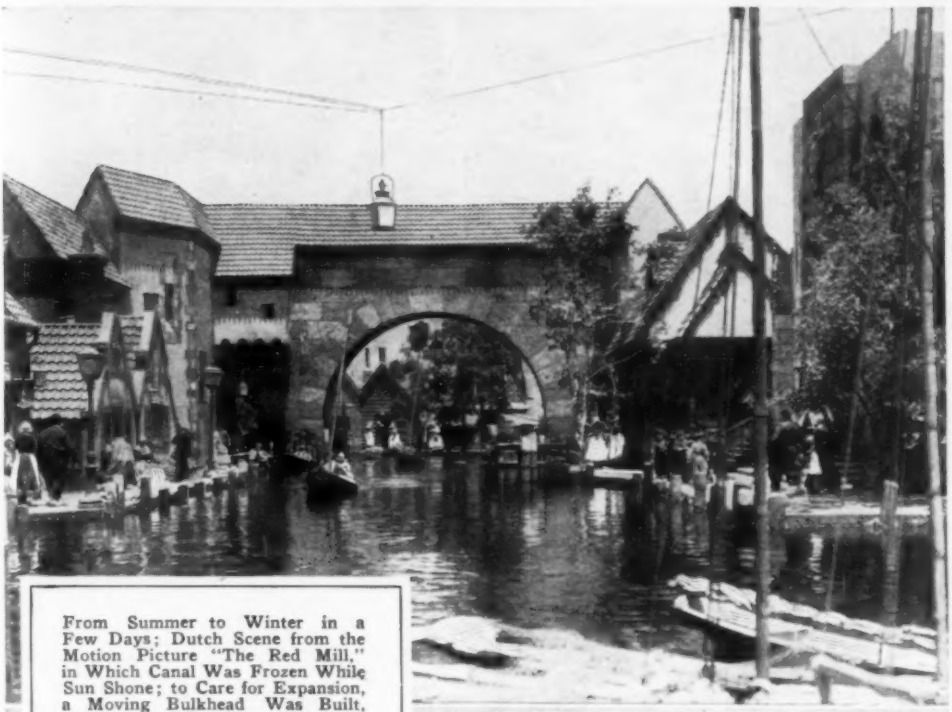
Seventy-five per cent of the sustaining power that keeps an airplane up is represented by suction on the top surface of the wing, according to engineers at the government flying field in Dayton, Ohio. They explain that the wing acts as a wedge, "splitting" the air and sending it streaming back and up almost vertically. This rush of air creates a partial vacuum above the wing back of the thickest part, and it is this vacuum, combined with the pressure of the air beneath, which does three-fourths of the sustaining work, the engineers assert.

LETTERS ON SHEETS OF WOOD ADVERTISE LUMBER PORT

Writing paper made from sheets of spruce veneer, so thin it takes a pile of eighty to make one inch, is used by the chamber of commerce of Hoquiam, Wash., to advertise the city as the world's leading lumber market. The veneer, which is produced by a box and basket manufacturer for use in his product, is flexible, folds easily and takes typewriter ink as well as any linen or wood-pulp paper. Hoquiam, which is an Indian word meaning "Hungry for Wood," got its name when the Indians observed that an enormous pile of driftwood collected in the harbor on both flood and ebb tides. The city won the leadership in the lumber market in 1924, when it was the first port to ship more than a billion board feet in a single year, and in 1925, the business exceeded that figure by approximately fifty per cent.

Letter Typewritten on Sheet of Wood So Thin It Can Be Folded; Note the Dark Grain Marks

ICE IS MADE WHILE SUN SHINES FOR MOVIE SET



From Summer to Winter in a Few Days; Dutch Scene from the Motion Picture "The Red Mill," in Which Canal Was Frozen While Sun Shone; to Care for Expansion, a Moving Bulkhead Was Built, and the Freezing Plant Was Large Enough to Supply a Whole City

Swan Auto Owned by Motorist in India; Exhaust Gas from Engine Hisses through Mouth to Warn Pedestrians

SWAN AUTO HISSES TO MAKE PEDESTRIANS STEP BACK

Motorists in India like originality in their cars, so one wealthy owner has had a special body built like a swan, while the front springs end in grotesque heads reminiscent of the griffins carved on medieval buildings. A multi-toned exhaust horn has been provided for emergency use, and the usual warning signal is given by the swan opening its mouth and hissing in realistic fashion at pedestrians who get in the way. The hiss is provided by exhaust gas from the engine. Instead of the usual headlights, a single globe surmounts the swan's head like a crest or comb, and a ring of smaller lamps is fitted around its throat, forming a sort of necklace.

REINDEER INDUSTRY IN ALASKA BRINGS LARGE RETURNS

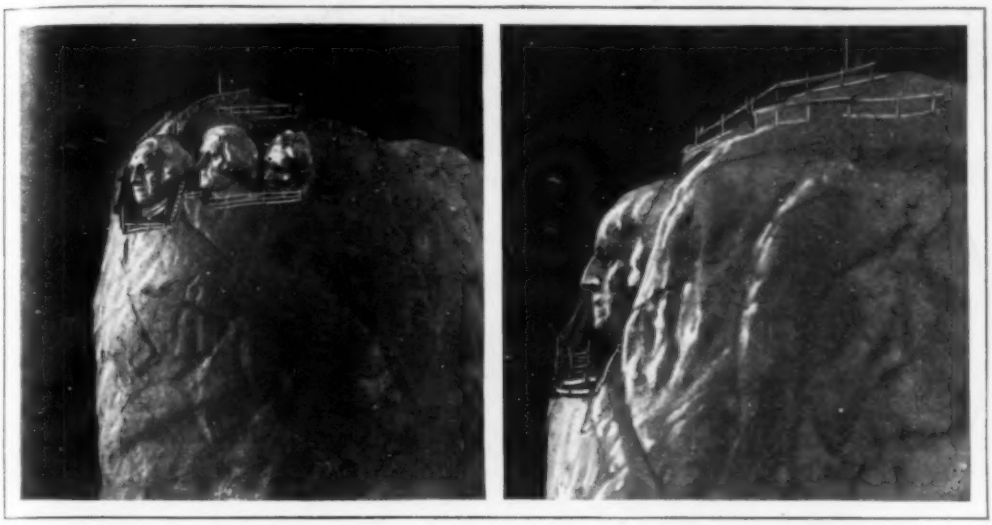
More than 350,000 reindeer, distributed in 110 herds, are now being kept in Alaska, according to the department of agriculture, and the average gross increase is between thirty-three and forty-five per cent annually. Within recent years, the raising of the animals has become an important industry. They are known as "three-way" producers, useful for food, clothing and for transportation, and in some sections, are supplanting the dog teams for hauling. The cost of production averages only about $1 a year for each reindeer, while prices of $10 or $12 are realized in the butcher markets. Between 1918 and 1925, nearly 2,000,000 pounds of reindeer meat were exported from Alaska. The government is endeavoring to improve methods of control and management of herds and the grazing facilities. It is said that the country can afford pasturage for at least 3,000,000 animals.

FINS ON SHIP'S HULL INCREASE SPEED

To reduce fuel consumption and increase the speed of ships, wing fins attached to either side of the hull have been devised by an English engineer. The idea is based on an interesting and probably little-known feature of navigation. With the ordinary form of ship water flows upward to the propeller so that part of that unit's work is to make the flow of water move in a horizontal direction. The purpose of the fin is to deflect the streamline horizontally without reducing the speed of the water to the propeller. Tests with the attachment on a motorboat resulted in a twenty-five-per-cent reduction in fuel consumption, while the astern speed was increased by about twenty per cent. In addition it was found that the steering qualities of the vessel were improved in a quite considerable degree.

Deflecting Fins Attached near Propeller Are Said to Reduce Fuel Consumption and Increase Speed

CARVING A MOUNTAIN TO TELL NATION'S STORY



© Gutzon Borglum

Models Illustrating How Faces of Washington, Jefferson and Lincoln Will Look When Carved on Natural Stone Monument; a Huge Tablet Will Be Inscribed on the Other Side of the Mountain

On Mt. Rushmore, in the Black Hills of South Dakota, Gutzon Borglum, the sculptor, is preparing to tell, in gigantic symbols, the story of the development of a nation. One side of the natural monument will bear the figures of Washington, "the creator," Jefferson, "the expansionist," Lincoln, "the preserver," and Roosevelt, who, in the words of Mr. Borglum, "in completing the passage to India by building the Panama canal, fulfilled the prophecy of Columbus." On the west side, in letters fourteen feet high, will be carved a huge tablet bearing the great dates in the history of the United States and simple statements of the significance of each. The figures of the men will be 200 feet high. The sculptor chose the theme for this work from the Louisiana Purchase, which led to the expansion of the nation, and traced its history back to the copper plates buried by the agents of the French king in taking possession of land, near Pierre, S. Dak., in 1742.

One of the Presses That Prints the Magazine for the Blind, and a Sample Page

MONTHLY MAGAZINE FOR BLIND HAS SIXTY PAGES

As a result of special presses and other apparatus developed by a blind man, persons who suffer a similar affliction are able to enjoy a monthly magazine. Its first appearance was so successful that it has now been increased to sixty pages and has national circulation. For the first time in their lives, many blind subscribers have been able to read advertisements and other matter common to the usual publication. Heretofore, most of their reading matter has been limited to books, and in some localities few of these have been obtainable. The magazine is printed in raised characters.

BEAUTY MASK PROTECTS GIRLS IN BASKETBALL GAME

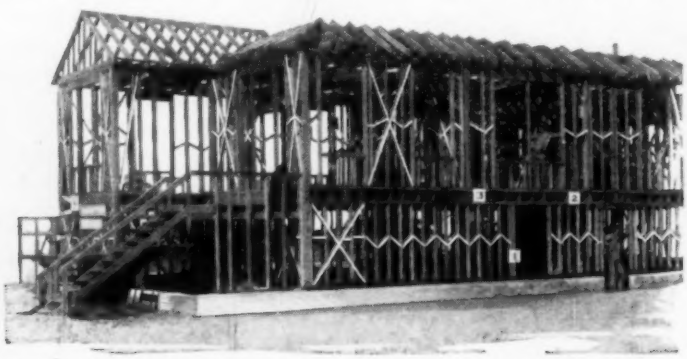
Members of a New York girls' basketball team have found various types of

Taking No Chances of Spoiling Her Looks; Girl Basketball Player with Face Mask

masks effective in protecting their faces and hair during strenuous games. The equipment includes boxing headgear and football helmets, but a modification of a divers' headpiece has proved especially popular. It shields the entire face and has openings for the eyes and the mouth.

HOUSE FRAME HEAVILY BRACED TO RESIST HURRICANES

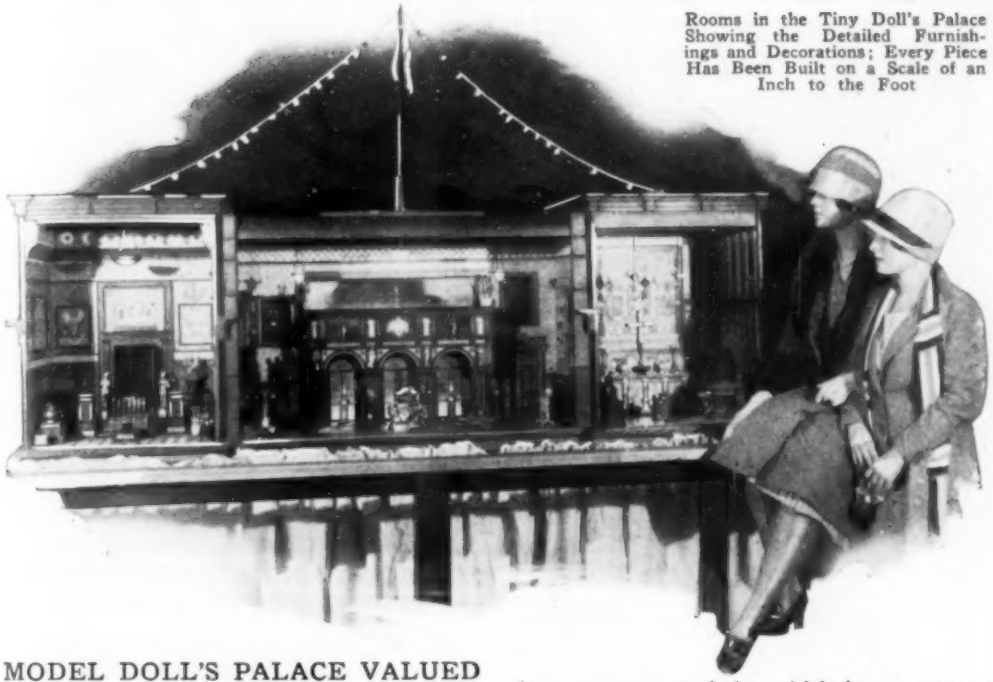
Last year's storms in the south taught the builders valuable lessons and have led to the adoption of new styles of construction. One, illustrated here, developed by the southern pine association, is notable for the fifteen points of bracing that it provides to insure greater rigidity and strength. The cost is said to be but six per cent more for lumber and five per cent more for labor over the usual methods, for the framework only. The type shown here is suitable either for wooden, stucco or brick-veneer finish.



Specially Braced Framework Intended to Reduce Damage in Case of Severe Winds; an Outcome of Recent Hurricanes

MANY LIVES SAVED BY RADIO IN STORMY YEAR AT SEA

Losses at sea would have been far greater than they were during 1926, had it not been for the radio, mariners declare. The year was marked by unusual severity in storms. Incomplete figures show that more than 400 craft were lost in the Florida hurricane and nearly 100 in Havana harbor in the Cuban blow. For the first three months, Lloyds register showed 124 vessels lost as compared with 105 for the first three months of 1925. Last October, the British sloop "Valerian" turned turtle, but the cruiser "Capetown," summoned by the SOS of the radio operator, who went down with the sloop, arrived in time to save nineteen of the 103 persons who were on the ill-fated ship. Wireless played an as important, although not so spectacular, part as human beings in the rescue of the men from the "Antinoe" by the crew and officers of the "President Roosevelt." During the general strike in England, more than 1,000 vessels were allowed to sail without radio operators, although the policy was challenged by the house of commons. A few ships must rely on themselves, as before the days of the wireless. The "Manchester Producer," with a cargo of cattle, had no radio equipment. The steering gear broke during a January storm and for weeks the vessel was adrift. The cattle had to be thrown overboard. The ship was finally found, after a month, by a Dutch tug and towed to the Azores. The tragedy probably would have been prevented, had the "Manchester Producer" been fitted with radio equipment.



Rooms in the Tiny Doll's Palace Showing the Detailed Furnishings and Decorations; Every Piece Has Been Built on a Scale of an Inch to the Foot

MODEL DOLL'S PALACE VALUED AT HUNDRED THOUSAND

Fashioned on a scale of one inch to the foot, an elaborate model palace exhibited in New York is valued at more than $100,000. It covers an area of sixty-three square feet and is twenty-seven inches high. Details, such as the furniture, etc., are carefully reproduced.

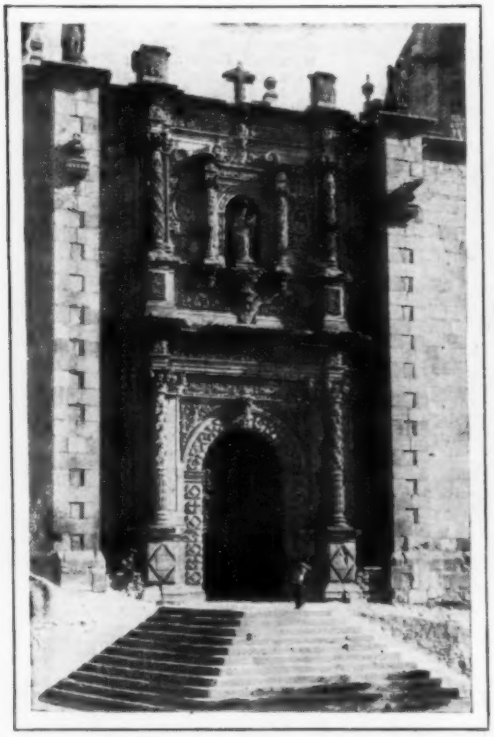
MEN OF TODAY ARE BIGGER THAN KNIGHTS OF OLD

Stories of conquests by the brave knights of old often leave the impression that all of these men must have been of giant physique. That this is not the fact is shown by a collection of armor recently sold by the Chicago historical society. Of several suits of steel, none was big enough for the average-sized twentieth-century man. One was so small that it was barely large enough for a woman, and the odd helmets, gauntlets and other accouterments were of correspondingly small size.

SHORT-CIRCUIT TESTS ON WIRE SHOW CABLE STRENGTH

High-tension electric wires were purposely short-circuited during recent tests in Chicago to determine what type of cable is best suited to withstand such emergencies without danger of communicating the rupture to other cables in the same line. The experiments were made in connection with the establishment of a 132,000-volt electric-power ring about the city, part of which will be run underground. Lines carrying 12,000 volts were chosen for the demonstrations, and the results indicated that the type of conduit now used is not broken by short-circuiting, the only serious damage being the burning away of the cable.

Smoke from Short-Circuited High-Voltage Wires



Church Front Whose Creator Escaped a Death Sentence by Making the Work Last a Life Time

ARTIST EVADES DEATH DECREE BY CARVING CHURCH

The Cathedral of Zacatecas, Mexico, has one of the most elaborately carved church facades in the country, but the work of carving was never finished. The stone carver who started the work, later committed a crime and was sentenced to death, but given a reprieve to complete the job, after which the sentence was to be carried out. Knowing that his life was safe so long as the church task lasted, the carver worked out such an elaborate design that it could not be finished in one man's life time, so he finally died of old age, and the church was never completed.

FLYING TORPEDO HAS RANGE OF ONE HUNDRED MILES

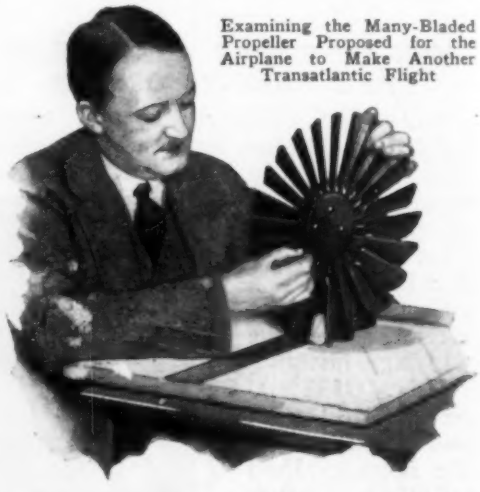
Designed to hit targets 100 miles away, an aerial torpedo was ready for use by the United States just before the close of the war, it has been revealed. Details of the mechanism are being kept secret, but it is now known that plans were in readiness to put out 10,000 of the flying guns, and experts declare that they would have been extremely effective against armies and fortifications far out of range of any other kind of ordnance.

THERMOSTAT FOR SPARK PLUG AIDS IN STARTING AUTO

Regulation of the spark gap is achieved in a plug recently introduced by means of a thermostat control which makes it easier to start the car. It is set to give an opening of .015 inch when cold and .030 inch when hot, the smaller gap facilitating a start after the motor has cooled, and the full opening providing the proper condition for normal operation. The change is produced by a piece of metal that expands and contracts.

FUEL-SAVING AIR PROPELLER TESTED FOR OCEAN TRIP

Wings ninety feet long, four air-cooled motors of 225 horsepower each, and a special type of propeller with many blades, are proposed features of the new airplane that is being planned for a non-stop flight from New York to Paris. One of the advantages of the propeller is that it requires less fuel, according to reports. The ship will be designed to prevent a repetition of the disaster that overtook the



Examining the Many-Bladed Propeller Proposed for the Airplane to Make Another Transatlantic Flight

Fonck-Sikorsky plane when it crashed to the ground and was burned as it was starting for France last year.

Young Prize Porkers of the Government Experimental Farm Line Up along the Fence to Pose for the Camera at Beltsville, Where Uncle Sam Studies Farming Problems Scientifically

How Uncle Sam Runs World's Finest Farm

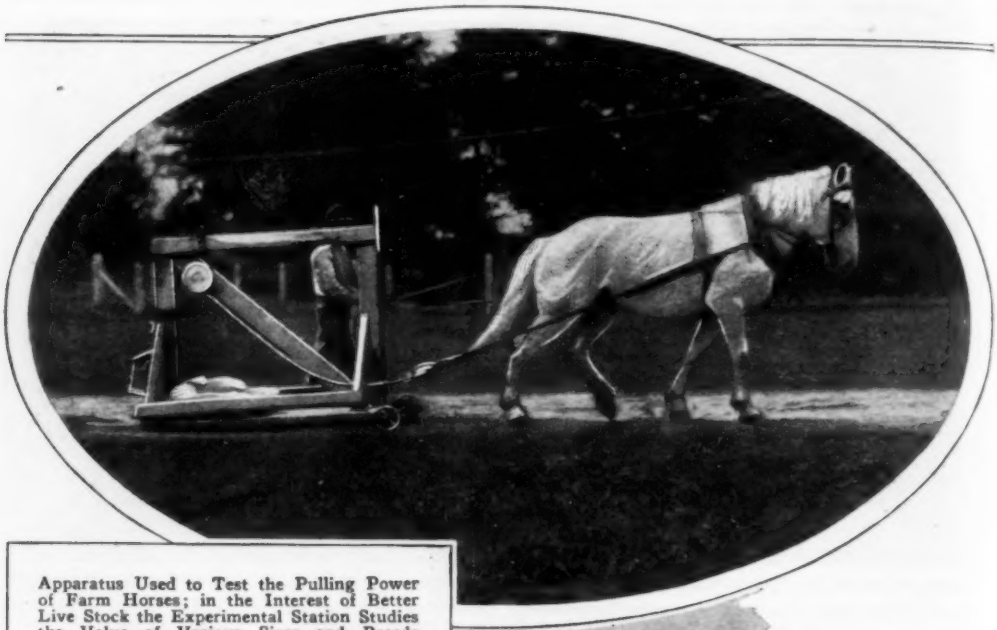
How Tough a Steak Is and Other Puzzling Problems of Animal Industry Solved at Agricultural Proving Grounds

HOW tough is a steak? Most everybody has applied the tooth test and has his own scale of judging, but as teeth and jawbone power differ, no two might agree. So Uncle Sam has set out to standardize the study of meat on delicate recording machines.

That is just one of the thousand and one farm problems that are being solved at the Beltsville farm, near Washington, claimed to be the world's finest. The navy runs a proving ground where it tries out new cannon, and Beltsville is the proving ground of the American live stock and allied industries.

If farmers could always market their beef cattle when the meat is at its best, the higher prices would mean millions in additional revenue. So the government is seeking to determine what makes the best meat and when it is at its prime. If every sheep had just a bit more and bit thicker wool, the crop would put millions more in sheep raisers' pockets. Therefore Uncle Sam at Beltsville is investigating wool. If all pigs, by proper feeding, could be shaped up with firm flesh before marketing, the large quantities of soft or oily pork which burden the market would be eliminated, and the hog rancher would have a surer income. The department of agriculture farmers are working on that, too. There are scores and hundreds of these farm problems, the solution of each of which means a very important farm relief, for it puts money directly into the farmer's pocket through his own effort. But aside from the specific problems, the government farm is investigating many more to establish important theories in animal raising. For example, 40,000 guinea pigs, the progeny, through twenty-six generations, of the original family at Beltsville, have been studied, and the greatest collection of genetic records ever gathered prepared to fix the basic laws of inherited traits and characteristics. The findings are important not only because of the financial value to stock raisers, but they may even throw light on the inheritance traits of human beings.

The proving farm has found how to



Apparatus Used to Test the Pulling Power of Farm Horses; in the Interest of Better Live Stock the Experimental Station Studies the Value of Various Sizes and Breeds of Animals in Order to Formulate Standard Specifications for the Best Horse for Each Farm Purpose; the Government Has Developed the Morgan Breed, Also, for Cavalry Mounts and Artillery Horses, and Is Now Experimenting with Crossbreeding of Other Strains

Milking Stand Developed at Uncle Sam's Experimental Farm for Use on Milk-Goat Ranches, Relieving the Milker of Tiresome Bending

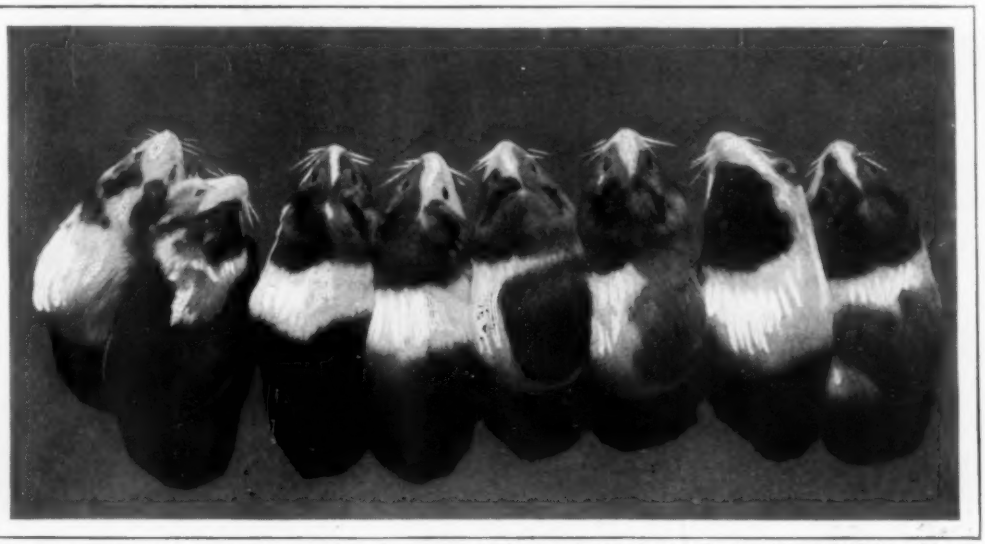
add a fraction of an inch to the average wool growth of a sheep. That means more money for the farmer, and probably cheaper clothing, too. The machines that test the strength of meat fibers in the effort to eliminate inferior, tough and stringy products from the market will pay dividends to the rancher, and they likewise hold promise of cheaper food for the consumer.

If all the pests and parasites that infest live stock can be eliminated, as many already have been, both farmer and consumer again will profit. And so it goes through all the list of experimental work. Folklore and scientific fact are being tested out side by side. Just recently, the department, after exhaustive experiments, announced that the common belief that planting should be done during certain phases of the moon had no foundation in fact, thus exploding another fallacy that has been observed by millions of small farmers. A long time ago the same investigators took up the problem of the danger to swine from glass bottles in the refuse fed to them, for it was an ancient belief that powdered glass caused death. They tested the belief by feeding glass to all kinds of animals, and found it didn't harm them.

All Eggs Laid by Hens in the Beltsville Flocks Are Marked for Identification So That the Parentage of Every Chick Is Known

Another field of work is the developing of new types of animals through crossing of existing strains. Because of the hardihood of the zebra, it was thought a cross between it and the domestic mule might produce a better grade of work animals. Imported zebras were mated with common asses, and the zebroids raised and broken, but, while they were strong and good workers, they inherited the bad tempers of both sides, and so had to be abandoned as draft animals.

Developing milk goats to provide a new food product, useful also in the cure



The Most Detailed Genetic Records Ever Assembled Have Resulted from the Study of 40,000 Guinea Pigs, Covering Twenty-Six Generations of the Original Family

of some diseases, the department has improved the breed of goats to the point where two 110-pound animals will yield as much milk a year as a 1,100-pound cow.

Beltsville boasts a model abattoir suitable for a small city. In this modern plant, swine, sheep and cattle, fed at the co-operating state experiment stations or at Beltsville, are slaughtered and studied. Valuable information has been gained which has revolutionized certain practices of the packing industry.

In the poultry establishment, more than 7,500 chickens of four popular breeds are raised annually. By careful selection and proper crossing, pullets and hens have been produced which now lay from 250 to 300 eggs a piece in one production season. The breeding and feeding tests have added millions of dollars to the profits of the American poultry industry. Methods of controlling pests and parasites have been perfected, new and satisfactory systems of feeding have been developed and all the important riddles of egg farming have been solved as they have arisen.

Uncle Sam has proved that he can grow out-of-season chickens as well in confinement under artificial conditions as on the range. Translated into terms of the restaurant menu, this means that you can enjoy the finest broilers in the dead of winter even though their production formerly was restricted to the period of the poultry-pasturing season. Codliver oil, yellow corn, sunlight, green feed and certain minerals hasten growth and make tender meat.

By trap-nesting the flocks and breeding only from the best pullets, the government flocks are increasing marvelously in egg-producing ability. Gains of as much as 60 to 75 eggs in a single generation have been recorded by painstaking selection and mating. Uncle Sam trap-nested 1,200 pullets and 500 yearling hens during last fall and winter, which is typical of the extensive scale upon which this work is conducted.

The completely equipped model dairy farm specializes in four leading breeds, produces milk for research and experimentation and delves into cow-farming perplexities which would never, otherwise, be attempted. A twenty-five-year breeding experiment is a topliner. It is a comparative test of the merits of line breeding as contrasted with outbreeding.

Even a Model Abattoir Is Operated on the Experimental Farm, and Experts from Various Organizations Judge the Carcasses for a Final Check on the Meat Animals Grown

One of the Latest Units for Travel in the Skies, the Five-Engine French Flying Boat Which Can Carry Twenty Tons of Bombs; Note Men in Front of Central Motor

FRANCE BUILDS GIANT PLANE WITH FIVE MOTORS

Claimed to be the biggest hydroairplane in the world, a new ship, constructed in secret by the French government, is powered with five big air-cooled motors, and is capable of carrying twenty tons of bombs in addition to its crew and equipment. Some idea of the size of the ship, which is a monoplane built on the thick-wing principle adapted for all-metal aircraft, is gained by comparison with the size of the two aviators standing in front of the central engine and propeller.

HOW CROPS PREVENT EROSION SHOWN BY TESTS

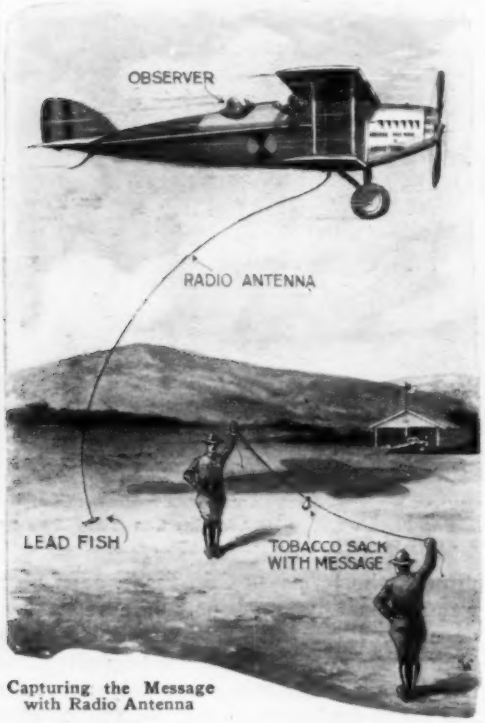
Interesting demonstrations, illustrating how crops prevent the soil from wearing away, have been conducted at the Missouri experiment station. The test field was a small plot with a slope equivalent to 3.68 inches to each 100 feet. Under average rainfall of 35.87 inches, it was shown, by collecting the run-off in tanks and weighing the sediment that ran off, a cultivated field without a crop would wear away at the rate of forty-one tons to the acre each year. That meant that it would take but twenty-four years to remove seven inches of surface soil over the entire acre. Sod land lost but .28 ton of dirt per acre each year. Where wheat was grown continuously, the loss was 6.6 tons, a corn plot was reduced by 17.8 tons, while a rotation of corn, wheat and clover lost only 2.3 tons to the acre, showing that an alternating system of planting not only prevents too rapid depletion of the soil in richness but reduces its erosion.

AUTO CAP WITH SLITTED VISOR PROMOTES MOTOR SAFETY

German automobile drivers are wearing a special cap with a long visor that has slits in it to permit seeing through and yet shields the eyes from the glare of approaching lights. It also protects the face from wind, is comfortable and, in the daytime, is a shade from the sun.

Copyright, Henry Miller

Wide-Visored Motorist's Cap with Slits Which Prevents Glare from Reaching the Eyes



Capturing the Message with Radio Antenna

AIRPLANE PICKS UP MESSAGE WITH LEAD "FISH"

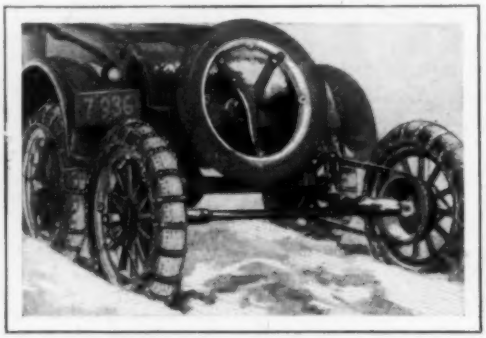
When the two-way radio apparatus failed, observers on the ground were perplexed as to how they could give instructions to occupants of an airplane during recent army maneuvers. The problem was solved by tying the dispatch in a tobacco sack weighted with small stones and attaching that to a string about twenty feet long, which was held taut by two men. The pilot, informed by the panel signal to stand by for instructions, descended close enough to see what was going on, then returned presently with the radio antenna unreeled. As he approached the men holding the string, he throttled the engine, allowing the lead "fish" at the end of the aerial to hang more nearly vertical. It caught the cord and the message was hauled into the cockpit. This method is now in general use for communication in the air corps when the radio sets do not work and when the panel signals will not give sufficient data.

STOVEPIPE MADE INTO ARMOR TO SUPPLY COLLECTORS

Collectors of medieval armor have so depleted the genuine supplies that clever forgeries of stovepipe and sheet iron are appearing on the market, according to reports. The Metropolitan Museum of Art has announced protection against such frauds in the form of a two-reel motion picture which is to be shown twice a day, illustrating what constitutes a genuine "tin suit." The layman is surprised to learn that a coat of chain mail weighed only about thirty pounds and that a complete suit of armor worn by a knight, weighed less than the pack carried by an American doughboy during the World War. Some of the suits of chain mail contained a quarter of a million links. Rust and other traces of old age are applied to the fake suits with acids and it is reported that some unscrupulous dealers exhibit the bogus suits in old castles to help deceive the gullible purchaser. The armor-making capitals of the world were Milan, Italy, and Augsburg, Germany.

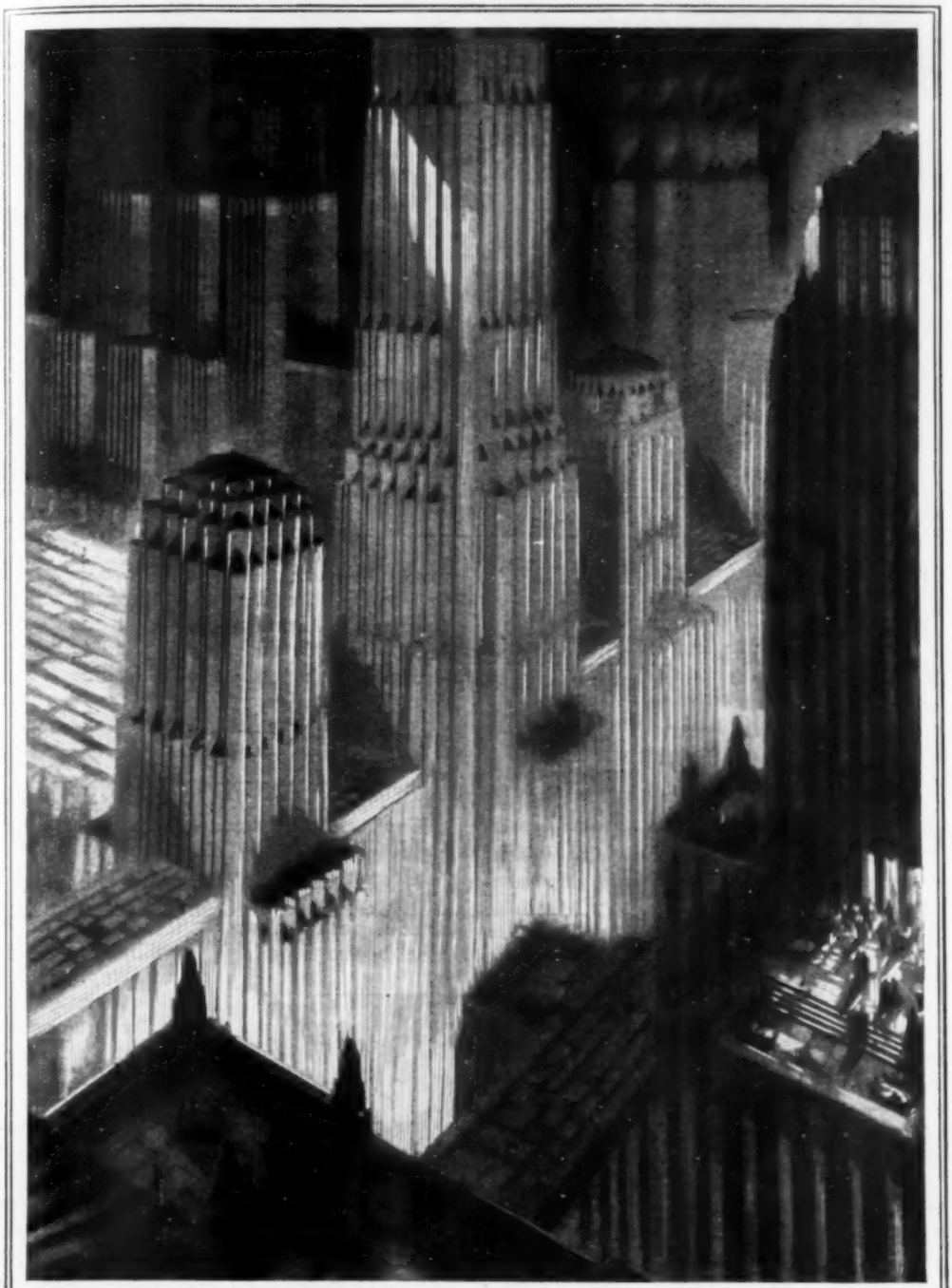
EXTRA REAR WHEELS FOR AUTO AID WINTER TRAVEL

To help push the auto through mud and snow, an extra pair of rear wheels that can be attached as quickly as a tire is changed, has been devised. They are chain-driven, sprockets connecting the extra and the original pair of wheels, and for travel through deeper snow, a pair of runners is slipped under the front wheels. Tests through drifts and mud have proved the complete success of the arrangement, according to reports.



Extra Rear Wheels Attached to Auto for More Traction in Snow and Mud

CITY OF THE FUTURE TO BE A FOREST OF TOWERS



An Architect's Vision of the City of Tomorrow; Sketch of Future Skyscraper Center by Hugh Ferris; "Corrugated Towers" with Tapering Tips Increase Effect of Height

Atlantic City's New Convention Auditorium, Which Will Seat Forty Thousand People and Be Big Enough for Indoor Football Games and Similar Large Sporting Events

CONVENTION HALL WILL SEAT FORTY THOUSAND

Atlantic City is building a convention hall to seat 40,000 people, expecting to have it completed in time for the summer conventions this year. The enormous auditorium will be 350 feet wide and 650 feet deep, big enough not only for conventions, but also for indoor football games, circuses and athletic events of all descriptions. Thirty thousand visitors will be seated on the main floor and stage and another 10,000 in the balcony. Radio amplifiers will be installed so that everyone can hear the words of a speaker. The stage will have a width of 100 feet and a depth of fifty, while the wings will be 180 feet wide on either side, sufficient to handle enormous pieces of scenery. In addition, there are to be fine dressing rooms and scenic and lighting equipment. The front section of the building is to contain space for art exhibits, and a small hall with a seating capacity of 3,000. Above it, other rooms will provide space for permanent exhibits of various sorts. The building will front on the boardwalk. Parking space in the basement for 1,100 automobiles and two restaurants with room for 1,000 diners will be other features.

A Natural Etching on Wood; the Painted Letters Stand Out in Relief against Weathered Background

PAINTED PART OUTLASTS WOOD OF ANCIENT SIGN

How paint keeps wood from weathering was graphically illustrated by an old "no hunting" sign. The letters, originally painted in red on a smooth surface, after a period of exposure, stood out in relief because the bare wood had gradually worn away. This was not brought about by rot organisms but by the repeated swelling and shrinking from changes in temperature and alternate rain and sunshine. While paint is not completely proof against moisture or fungi, it affords an excellent protection against weathering, since it retards the absorption of dampness sufficiently to lengthen the life of the wood itself.

RICH DEPOSIT OF POTASH FOUND IN SOUTHERN OIL FIELDS

Vast deposits of potash, sufficient to care for the world's needs for 1,000 years, according to estimates by United States geologists, have been discovered in the cores taken from oil wells in Texas and New Mexico. The material lies less than 1,000 feet below the surface, and analysis shows that it contains nearly fifteen per cent of potassium salts valued for fertilizer. This is said to be richer than that from the famous mines in Prussia and Alsace, where large quantities of potash have been found at depths ranging from 3,500 to 5,000 feet. With the late processes for taking nitrogen from the air and this wealth of potash close at hand, the United States will be less dependent upon foreign countries for fertilizer supplies.

SCHOOL FOR FASHION MODELS AIDS STYLE DISPLAYS

Before mannequins are fitted to display hats and garments in some of the larger model shops, they must undergo special training. This is given under the eyes of critical observers, while the candidates endeavor to learn the proper walk and carriage by balancing books on their heads as they parade. Other details, such as the movements of hands and arms, are also considered important.

© P. & A.
Candidate Models Learning to Walk and Pose While Balancing Books on Heads; a Fashion-School Stunt

Where Tourists Enjoy Views of a National Park; the Observation Tower at Hot Springs Resort

U. S. HAS AN "EIFFEL" TOWER FOR PARK VISITORS

Popularity of the Hot Springs national park in central Arkansas has increased, from the tourists' point of view, because of the observation tower the government has erected on the top of a mountain. Although it is but 165 feet high and, with the summit below it, gives an elevation but two-thirds as high as that of the famous Eiffel tower in Paris, it affords an excellent view of the surrounding country. An elevator carries visitors who do not wish to climb the stairs, and the structure is strongly built of steel and concrete. Last year, the park counted 265,000 tourists, a number comparing favorably with the 220,000 American travelers who were registered in Paris.

Stalactite Hall in New Zealand Cavern Which Is Lighted by Myriads of Glowing Worms That Spread Their Webs from the Walls and Light Them to Lure Their Prey into Reach

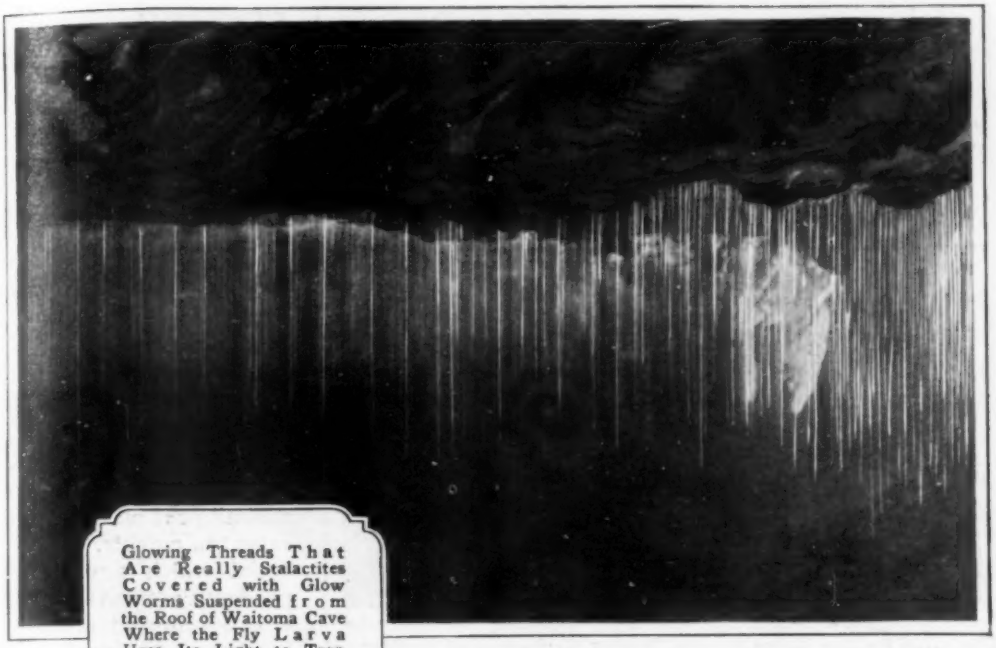
Exploring Fairylands of the Underworld

CAVES filled with gleaming stalactite columns hanging from vast chambered roofs and lighted by the gleaming torches of myriads of glow worms have been discovered in New Zealand and are being opened for public exploration. The system of limestone caverns, which in appearance and extent rival the famous Mammoth cave group in Kentucky, is unique in that the surface of the ground is equally remarkable, with pits and fountains and other scenery that resembles the Yellowstone park.

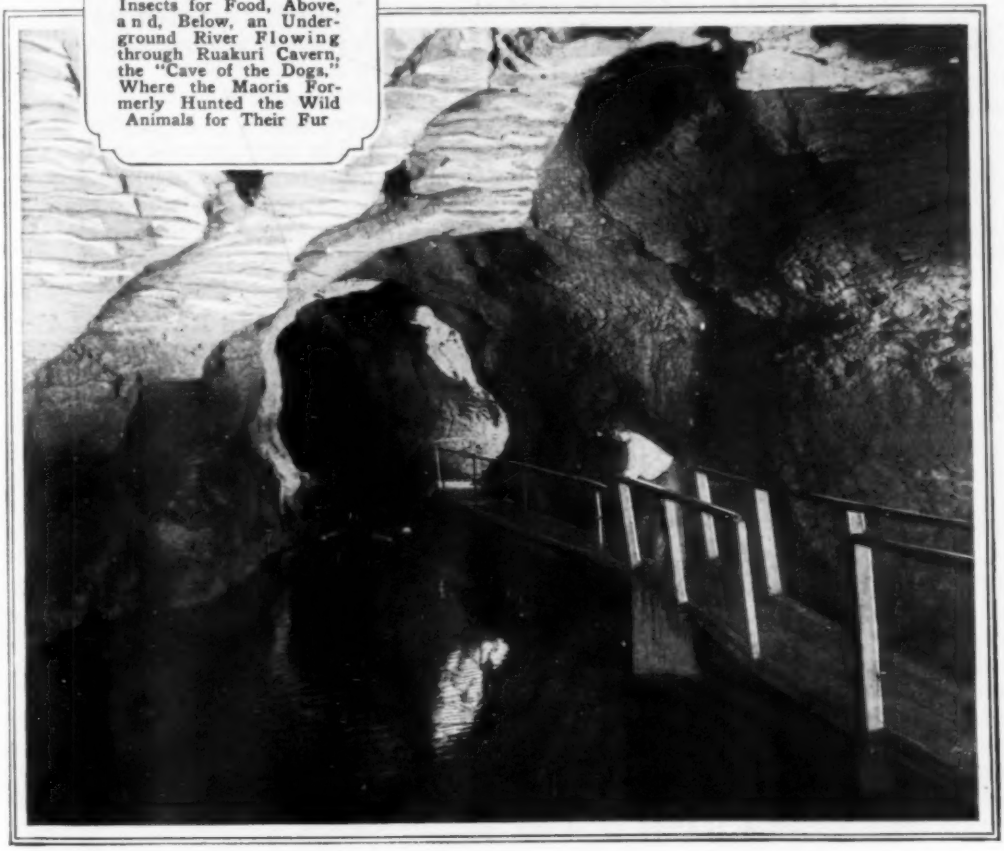
Most remarkable of all, though, are the glow worms that illuminate the glistening stalactite halls with a ghostly light. The worm is the only known one of its kind that is an insect eater, and its lighting equipment is used to lure food into its web. The cavern ceilings and walls are covered with millions of the webs, each coated with a sticky substance. In a slender tube in the center of the web lives the larva of a fly, which lights up its home with a pale glow to attract the midges flying above the underground rivers that thread through the caverns.

The glow worms apparently have a keen sense of hearing and are easily frightened, for if a word is spoken by the visitors or a strange sound is made the myriad lights flick out as abruptly as though an electric switch had turned them off. After silence is restored, there is a pause, and then they come blinking on again.

The cavern group for many years was the homeland of the savage Maoris. It was not until little more than thirty years ago that the caves were discovered by white men. Now the New Zealand government has erected a rest camp at one of the caves, called Waitoma, and constructed an automobile road from the nearest railroad, six miles away. A second of the caves, called Ruakuri by the Maoris, is only a short distance from the Waitoma.



Glowing Threads That Are Really Stalactites Covered with Glow Worms Suspended from the Roof of Waitoma Cave Where the Fly Larva Uses Its Light to Trap Insects for Food, Above, and, Below, an Underground River Flowing through Ruakuri Cavern, the "Cave of the Dogs," Where the Maoris Formerly Hunted the Wild Animals for Their Fur



Elks' Club Building in Los Angeles, Showing Combination of Architectural Styles and Use of Figures for Decoration

HANDSOME CLUB BUILDING COST TWO AND A HALF MILLION

Unusual architectural features have been combined in the Elks' new club building in Los Angeles, recently completed at a cost of $2,500,000. From the central portion, several stories rise in diminishing masses, suggesting the skyscraper, but the two wings of the building are designed along the lines of a monument, with arches and human figures. Gothic, Romanesque and Renaissance styles are applied in it, while the roof of the clubhouse has a patio, following the Spanish traditions of California and permitting a view of the surroundings. A lodge room, 135 feet long and seventy-five feet wide, and a $50,000 organ are outstanding features.

POOR YEAR FOR RADIO DISTANCE EXPERT DECLARES

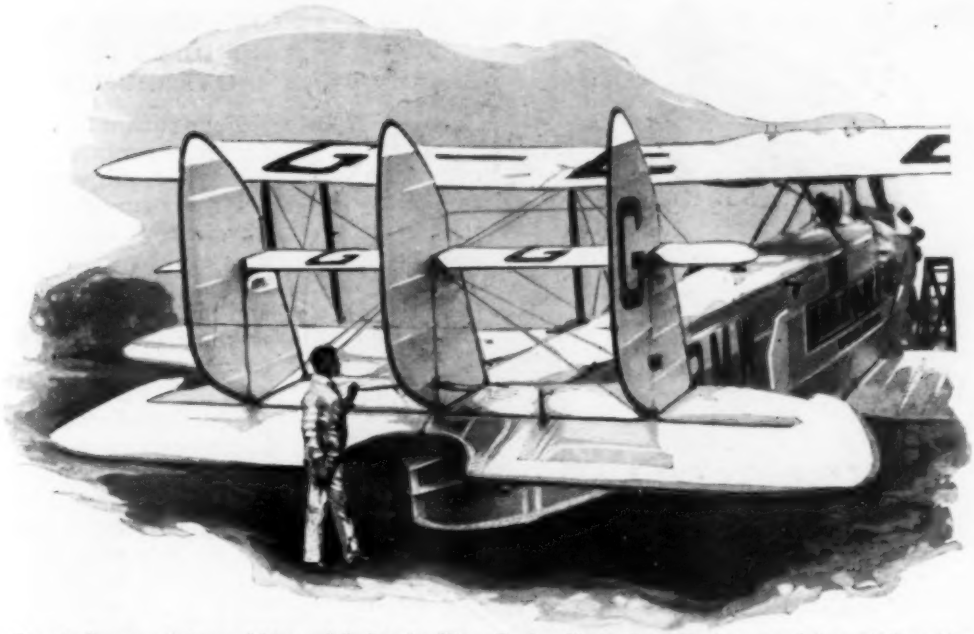
In the opinion of Dr. J. H. Dellinger, chief of the radio laboratory of the bureau of standards, the year 1927-28 will be the poorest for long-distance wireless reception since 1922. After this period, an improvement will be noted until 1933. His views are based on a sunspot cycle of eleven years. The last sunspot minimum was in 1922. Since that time, conditions should have grown progressively worse, reaching a climax about 1928, when reception should improve as the sunspots disappear.

WATER ABSORBER FOR SOIL TO AID PLANT GROWTH

Plant growth is limited in many regions, not because of insufficient moisture but because the rainfall runs off or evaporates too quickly. A material which promises productive cultivation in these semiarid sections has been introduced by a Michigan circuit judge. In effect, it provides millions of tiny reservoirs to retain the moisture where it can be reached by the plant roots. It is a mineral substance and is to be applied at the proper depth in lump, powder or emulsion form, to establish a water-holding layer. Marked success with it has been reported from experiments in which lawns and golf courses have been treated.

KNIFE THAT USES RAZOR BLADE HAS EXTRA ATTACHMENTS

Several useful articles are combined in a pocketknife that employs a discarded razor blade for its cutting edge and is flat, to take up but little room. Bottle opener, corkscrew, twine and cigar cutter, and a nail file and cleaner are included, making the knife a small compact article. When closed, the blade is safely shielded.



For Air Journeys between Africa and India; the Three-Engine Plane That Flies between Cairo and Karachi; It Has a Speed of 117 Miles an Hour

PLANE FOR ORIENTAL AIR LINE SPANS EIGHTY FEET

Latest developments in flying are represented in the monster airplane for the line between Cairo and Karachi, linking Africa to India. It has three engines designed to keep the plane aloft at a speed of 117 miles an hour, is fifty-six feet long with a wing span of eighty feet. The craft is of the so-called "Hercules" type.

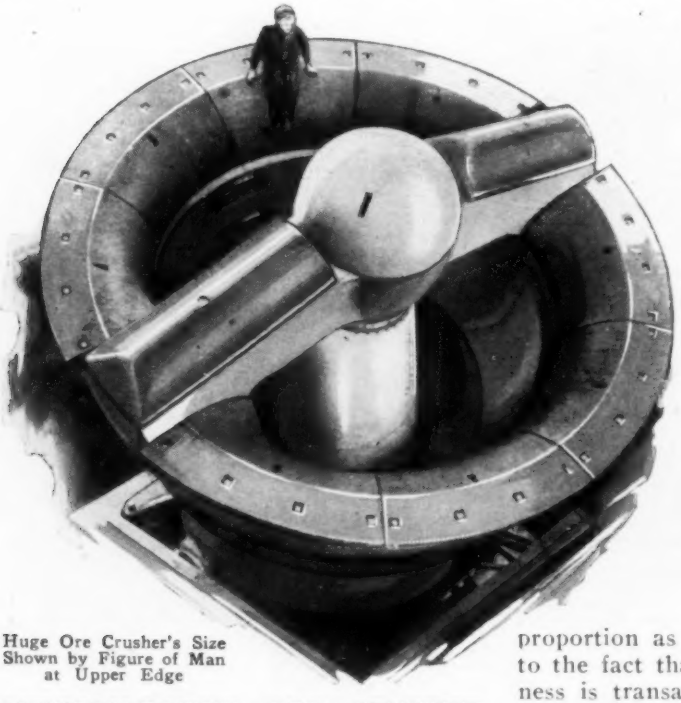
CUT DOOR IN COW'S STOMACH TO ANALYZE FOOD

To solve a question as to the cow's digestive processes, investigators at the Pennsylvania agricultural experiment station have cut an opening in the stomach of a live animal so that its food can be analyzed. The contention was made that the cow's milk would contain vitamine B even when that substance was not present in the food consumed, since it was believed that the vitamine was manufactured during digestion. To determine this, the incision was made in the stomach in such a way that samples of the organ's contents could be taken for analysis. The operation was performed with the aid of local anæsthetics.

OIL SHOT FROM SIPHON BOTTLE LUBRICATES AUTO SPRINGS

Squeaky portions of the automobile body, the springs, and other places difficult to reach, can be easily lubricated without soiling the fingers or clothing by a special oil which is shot from a bottle with a strong siphon action. The contents of the unit is under considerable pressure and the outlet mechanism is so arranged that a penetrating stream is directed until almost the last drop has been used. The outfit is recommended for prevention of corrosion on battery terminals, loosening bolts, etc.

White Line Indicates a Stream of Oil Being Shot at Auto Spring



Huge Ore Crusher's Size Shown by Figure of Man at Upper Edge

MILLION-POUND ORE CRUSHER SHIPPED TO CHILE

Shipping experts had to prepare special equipment to handle two gigantic ore crushers which were sent from Milwaukee, Wis., to a mining company in Chile. The ponderous units each weighed about a million pounds.

FIND GOLDEN CALF'S ANCESTOR IN ANCIENT STATUETTE

Among other articles of royal treasure taken from the tomb of a king of Palestine who ruled some 3,700 years ago, was a statuette of a golden calf, fifteen or eighteen inches high. It is thought to be the forerunner of the idol of Moses' time, 500 years later. On a breast ornament, also taken from the tomb of the unknown monarch, was a design of the Egyptian cow goddess, probably the prototype of the golden calf of the Hebrews, according to Dr. James H. Breasted, of the University of Chicago. All the treasures were of Egyptian workmanship, showing that the culture of the Nile was dominant in Palestine and that the king probably was a vassal of pharaoh. The gold on the statuette is thin and worth only a small sum.

CITY-OFFICE NEEDS STUDIED TO CURB OVERBUILDING

Four square feet of office space per capita is the normal requirement of an average American city, according to findings of the national association of building owners and managers. A survey was made recently to determine the causes responsible for the overproduction of office space in many cities, following the building boom of the last few years. It was shown that cities which are capitals of states do not absorb commercial-office space in the same proportion as other cities, chiefly owing to the fact that a large amount of business is transacted in state offices. The bank clearings, business done and the population were found to be important factors in determining the office space needed.

RUNNING-BOARD CAN CARRIER SAVES AUTO UPHOLSTERY

Adjustable to cans of different sizes, a carrier attached to the automobile running board, clamps milk cans, egg crates and similar articles securely and makes it easier to load and unload them, as they do not have to be lifted so high. The sides that grip the can are lined with leather for greater safety. The carrier also spares the interior of the car, which is often damaged by the practice of transporting shipments of cream and other produce inside. Several brackets may be attached to one running board.

Stainless steel is being tested by the army ordnance department in rifle barrels.

HOW MOVIE THRILLERS OF AUTO RACE ARE MADE

Motion-Picture Camera Attached to Front of Auto for Recording Facial Expressions of Driver during a Racing Scene; It Turns Automatically

Secured to the radiator of the car and accurately focused, a motion-picture camera is adjusted to register the expression on the driver's face. The plan has proved especially effective in taking racing scenes, for instance, when much of the action can be told by facial and other details.

AIRPLANES TO CROSS ATLANTIC IN ROUND TRIP A WEEK

Interest of the flying world is being directed toward Germany, where two private firms are preparing airplanes for flights across the Atlantic with a view toward establishing regular schedules and carrying more than 100 passengers on weekly round trips. Tests with one of the ships are expected shortly. A full-size model already has been constructed. Both companies are incorporating new principles in the flying craft. One type has two bodies, each seventy-eight feet long, a wing spread of 265 feet and total carrying surface of approximately an acre and a half. It will have four motors of 1,000 horsepower each, will weigh, without fuel, thirty-five and one-half tons and will carry 2,700 gallons of fuel. For its 100 passengers, sleeping cabins will be provided and the crew will number twelve or fourteen. The other plane has been described as a "flying wing." In effect, it is to be a huge hollow unit so arranged that the weight is distributed to proportionate parts of the carrying surface instead of being concentrated in one or more bodies.

Model of Boat with Self-Bailing System and Ventilating Unit, to Prevent Sinking

AUTOMATIC BAILER FOR BOATS TO PREVENT SINKING

Designed especially for small craft such as pleasure, life and fishing boats, an automatic bailing system is intended to quickly rid a vessel of water even if it carries an excess load. In connection with this, a safety ventilator has been constructed to prevent the entrance of water without hindering the air supply.

The ARMOR of the

Roller-Skate Hockey Requires an Outfit like That of the Ice Game

Gleason, Goal Keeper of Princeton's Ice-Hockey Team, in His Heavily Padded Suit

Friedman, Michigan Football Star; the Helmet, Shoulder, Hip and Leg Pads Are the Chief Parts of the Player's Armor

Dempsey Sparring with Tommy Loughlin; Both Wear Ear Masks

Cricket Captain G. E. W. Bowyer, Wearing Lattice Leg Guards and Finger Protectors

Modern Knight

Type of Gas Mask Worn by Students at University of California during Instruction in Mine Rescuing

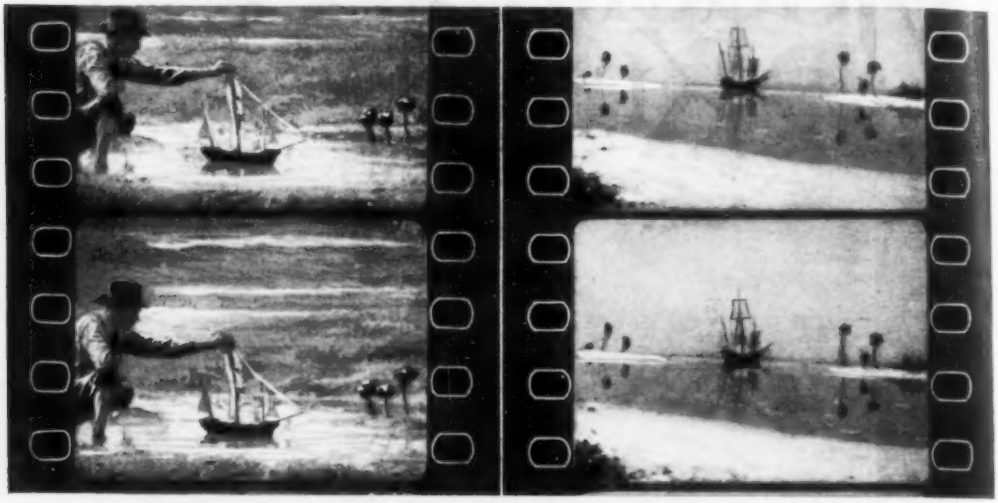
Gen. Smedley Butler, of Philadelphia Police Fame, Poses in Baseball Catcher's Uniform; the Latest Masks Are Designed to Afford a Less Obstructed Vision and to Slip Off More Easily than the Old Ones

Lieut. Comm. Byrd Found Need of Warm Clothing in Arctic Flying

Coach F. Darrie Ulat in the Latest Armor for Ancient Sport of Fencing

Goggles and Helmet Are Important Units of Motorcycle Racer's Equipment

WHY YOU CAN'T BELIEVE ALL YOU SEE IN MOVIES



Reality and What the Camera Made of It; an Interesting Example of the Art of Picture Faking; at the Left, Adjusting the Model Ship for the Scene at Right

There flashes on the silver screen a bit of tropical seascape, a beach of white sand, a little bay opening out into the ocean between two sandspits on each of which palm trees rise. Along the shore glides a ship such as Columbus commanded. "Looks like Florida," a spectator remarks, "but where did they get the ship?" It wasn't Florida. There was no ocean. There were no palm trees. It was just a good job of magnifying miniatures, a process frequently used in the motion-picture studios and one that the novice with his own movie camera can practice with much enjoyment. The ship was a twenty-inch model. The "ocean" was an artificial pond, about twelve feet square and six or eight inches deep, and the sky and horizon were represented on a canvas screen standing in the water. Sand and twigs with a bunch of feathery leaves to imitate the palm trees were used for the beach. The palm leaves in the foreground were borrowed from a genuine tropical film and double-printed into the scene in making the positive. The ship was navigated by black threads under the water. The camera was set sufficiently close so that the scene covered the entire "frame" and was cranked at high speed.

REMINDER CHART FOR MOTORIST TELLS WHEN TO CHANGE OIL

Hung on the garage wall, a disk chart helps keep a record of oilings and tire changes on the car. An inner card is divided into a series of numbers from 500 to 40,000, representing mileage, and by turning it, figures appear at intervals of 500 to 2,000, to denote when it is time to renew the cylinder oil, light machine oil and cup grease. A similar record is presented at the upper edge of the chart on another disk, to keep track of the time when each tire had been changed.

When Did You Last Change the Motor Oil? This Disk Tells and Shows When a New Supply Is Needed

AIRSHIP GONDOLA CAN BE USED AS MOTORBOAT

Detachable from the envelope of an airship, an all-metal car can be used as a motorboat. It is constructed of duralumin, the aluminum alloy, and the propellers are above the water. In other particulars, it is operated much like the ordinary water craft. It is thought that the arrangement will be of great aid in emergencies, as it can be quickly disconnected for rescue work along the coast and attached again to the airship hull, which can be withdrawn to a safe distance from the shore, while the car is being used on the surface.

Paul Krebbing with His Model Merry-Go-Round, Made in Spare Time

MODEL OF MERRY-GO-ROUND RUN BY ELECTRIC MOTOR

Most of the features of the standard-size apparatus are duplicated in a tiny merry-go-round a California craftsman has completed. It is operated by an electric motor, tiny horses and goats gallop and tubs move while music is furnished from a small organ. Electric lights and a dancing doll are additional details.

SLIDING PANEL FOR AUTO DOOR AIDS SIGNALING

Opened much more quickly and easily than the regulation auto door glass, a sliding panel allows the driver to reach into mail boxes or give arm signals with less trouble. It is installed simply by lowering the main glass, slipping the frame in place and cranking the door pane up until it comes firmly against the inserted unit. For winter driving, this arrangement is considered an improvement, as it permits ventilation without admitting too much cold air.

Mail Carriers Find the Sliding Panel Easier to Open than the Glass of the Auto Door

URGE REFUGE FOR GAME BIRDS TO PRESERVE SUPPLY

Creation of bird sanctuaries throughout the country, where wild fowl may nest and feed in safety, is proposed in a federal game-refuge bill, and sportsmen are recommending its adoption to check the rapid decrease in the number of birds. The plan includes the establishment of public shooting grounds, adjacent to the preserves. According to experts ducks in the western part of the country are threatened with extinction, unless ways are found to combat a form of paralysis which afflicts them after drinking contaminated water. This disease is widespread near Great Salt Lake. It afflicts other marsh birds as well as ducks and, when least prevalent, takes a toll of 30,000 to 100,000 yearly, while more than 1,000,000 ducks alone are killed in the worst years. The salts in the waters have made them poisonous to the fowls. The malady does not prove fatal if the birds can get to fresh water in time.

GIANT CRUSHER FREES SHIPS LOCKED FAST IN ICE

Car Ferry "Sainte Marie" with Its Plow Raised Ready for an Attack on the Ice Jam in the St. Mary's River; for a Time, the Blockade Threatened to Trap the Crusher

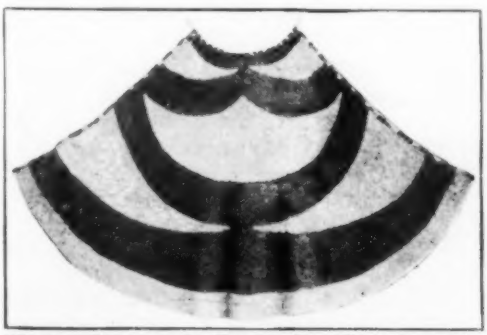
Equipped with a huge plow that can be raised or lowered, the giant car ferry "Sainte Marie," built to keep the route between Mackinaw City and St. Ignace clear of ice, nearly met its equal in a jam that tied up more than 100 vessels and cargo valued at $25,000,000 early last December. With engines racing at top speed, the battering ram was launched in repeated attacks against the frozen barrier before the blockade was finally broken. Three powerful tugs assisted by yanking a steamer into the opened channel, thus releasing other ships. The car ferry's huge size, generally an aid, was a handicap to a degree, for it had to be managed cautiously lest its bulk become trapped in the ice and the tie-up still further complicated. The jam occurred in the St. Mary's river, the gateway from Lake Huron into Lake Superior. Great cakes of ice, wedged between the narrow cuts on each side of Neebish island at the head of the river, formed the difficult barrier.

AIR-MAIL PILOTS EARN AS HIGH AS NINE THOUSAND YEARLY

Good pay as well as the lure of excitement, partly explains why there is such a large waiting list of candidates for positions as air-mail pilots. Salaries range from $4,000 to $9,000 a year. There is a base pay of between $2,000 and $3,600, depending upon the length of service, and, in addition, a mileage rate for service. For daylight flying, pilots are paid five cents a mile between Cleveland and Cheyenne, six cents between Cheyenne and Reno, and seven cents between New York and Cleveland and Reno and San Francisco. The scale is doubled for night flying. Not long ago, two superintendents of flying fields returned to piloting, attracted by the pay and the excitement of the work.

HAWAII FEATHER CAPE IS VALUED AT MILLION

One of the wonders of the National museum in Washington is a ceremonial cape, once the property of Hawaiian kings. It is made of thousands upon thousands of tiny feathers and is valued at $1,000,000. The garment was presented to Commodore J. H. Aulick, of the United States navy, in 1841, by King Kamehameha III and is one of the handsomest specimens of the art of feather-cape making in existence. Skilled hunters captured the birds, a species now extinct, and from each was obtained only a tuft of three to five little feathers for which a price equivalent to $1.50 was paid for three. They were arranged so smoothly that the finished cape resembled plush. The crescent design was worked in red and yellow feathers. The cape is forty inches long, eleven and one-half feet around the lower edge and twenty-three inches about the collar. From fifty to 100 years were required to complete it and only kings were permitted to wear it. Garments such as this were in reality a refined form of war paint. Their primary use was as a military decoration.



Worth a Fortune; the Feather Cape Once Owned by Hawaiian Kings and Worn at Formal Ceremonies

Without Twisting or Turning the Head, Several Different Views Are Presented from This Multiple Mirror

SPECIAL MIRROR FOR STYLES SHOWS MANY VIEWS

Profiles, silhouettes and front views as well are revealed by a multiple mirror a French fashion expert has devised. At one sitting, a prospective hat buyer, for instance, can see how the piece will look from many angles.

MAGNETS LOCATE SUNKEN AUTO LOST IN DEEP POOL

Following a fatal automobile accident in an eastern city, the car, which had fallen into a deep pond and disappeared, was located by a simple and ingenious expedient. Several magnets were tied to a rope and dragged along the bottom in a line from the tracks left by the wheels. The men holding the cable felt a tug when the magnets were attracted to the steel of the car and the auto was soon hauled from under thirty feet of water, where it had stopped not far from shore.

Thrills in the Hunt

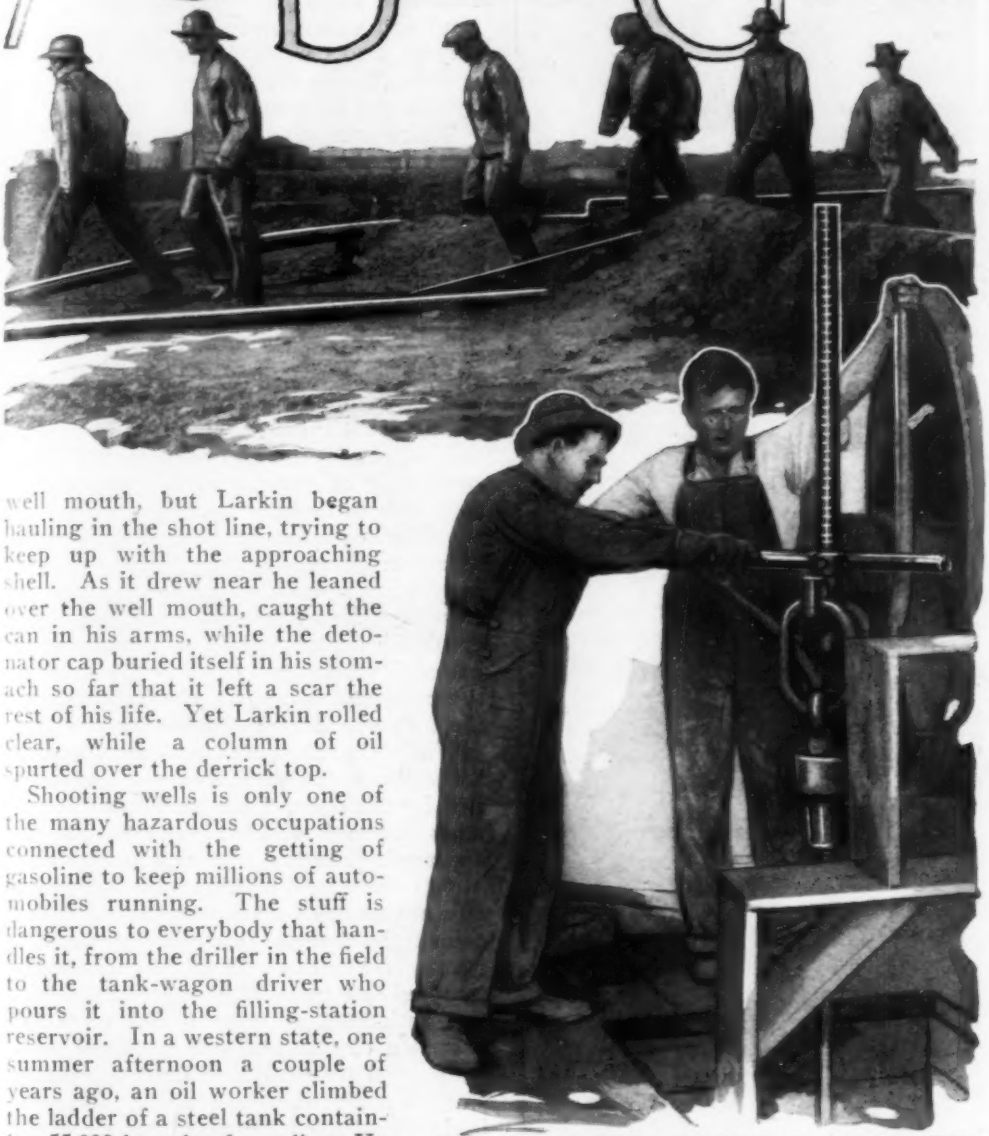
HOW would you like to stand over the mouth of a hole a couple of thousand feet deep, waiting for twenty quarts of nitroglycerin, propelled by a flood of black oil, to come up and hit you in the stomach? John Larkin, one of the best well shooters in the west, had that experience a few years ago, and lived to tell about it. It was just one adventure in the life of an oil man, where the drillers shake hands with death every day.

Larkin had been employed to improve a well which had been flowing by fits and starts, like a Yellowstone park geyser. The improving process consisted in dropping five-gallon canisters of explosive down the casing and then firing them off by a "chaser," a heavy metal weight sent speeding down the sand line by which the nitro was lowered.

The well was gushing every half hour. Immediately after one gush had subsided, Larkin eased down the first can of explosive and touched it off. After the next flow of oil ceased, he sent down a second bomb and exploded that. Still the well didn't work right, so he waited until after another oil spurt, and began to lower the shot canister. Suddenly he felt the weight on the line ease up, and realized the well had begun to flow, and the twenty quarts of nitro was riding back to the surface on top of a speeding column of oil.

There was time to run to safety before the can blew out of the

for Black Gold

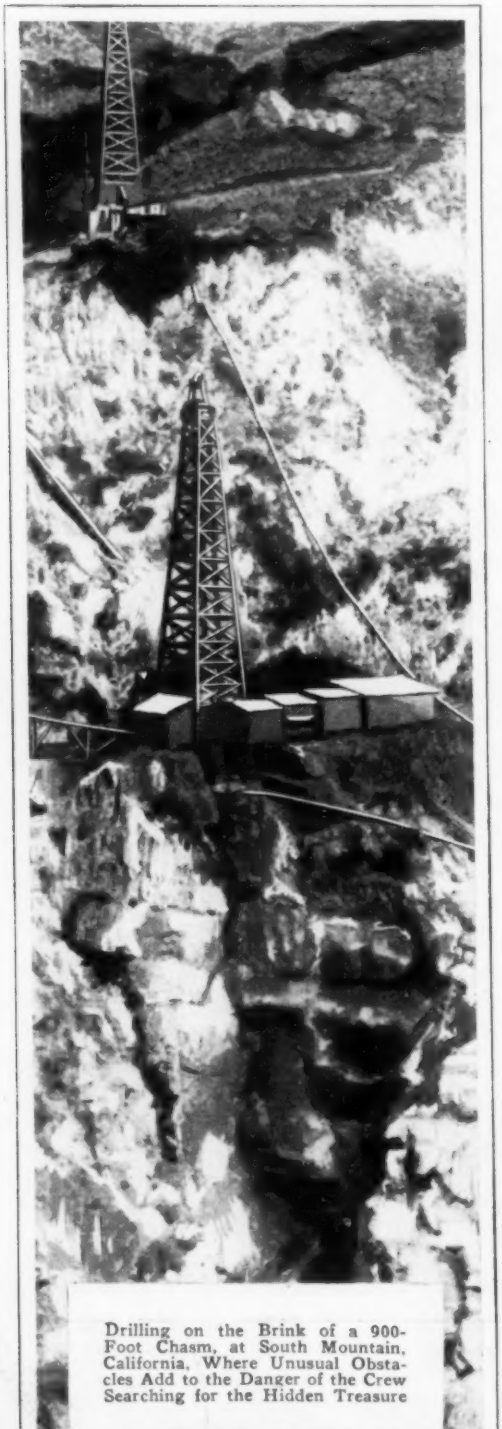


Oil-Well Firemen Fighting a Blazing Gusher, Above, and Drillers on the Derrick Floor Unclamping the Tools from the Cable

well mouth, but Larkin began hauling in the shot line, trying to keep up with the approaching shell. As it drew near he leaned over the well mouth, caught the can in his arms, while the detonator cap buried itself in his stomach so far that it left a scar the rest of his life. Yet Larkin rolled clear, while a column of oil spurted over the derrick top.

Shooting wells is only one of the many hazardous occupations connected with the getting of gasoline to keep millions of automobiles running. The stuff is dangerous to everybody that handles it, from the driller in the field to the tank-wagon driver who pours it into the filling-station reservoir. In a western state, one summer afternoon a couple of years ago, an oil worker climbed the ladder of a steel tank containing 55,000 barrels of gasoline. He started across the roof of the tank. A flash of fire shot into the heavens and the ground trembled. When the smoke cleared away, underwriters found part of one of the victim's shoes half a mile away. On the heel was a little iron disk. The verdict was that this had hit the head of a bolt on top of the tank and had thrown a spark, igniting gasoline vapors and causing the explosion.

Another day a drilling crew was at work in a well which was not thought to be near an oil-sand zone. One man was working on a platform in the upper part of the derrick. Suddenly there was a rumbling



Drilling on the Brink of a 900-Foot Chasm, at South Mountain, California, Where Unusual Obstacles Add to the Danger of the Crew Searching for the Hidden Treasure

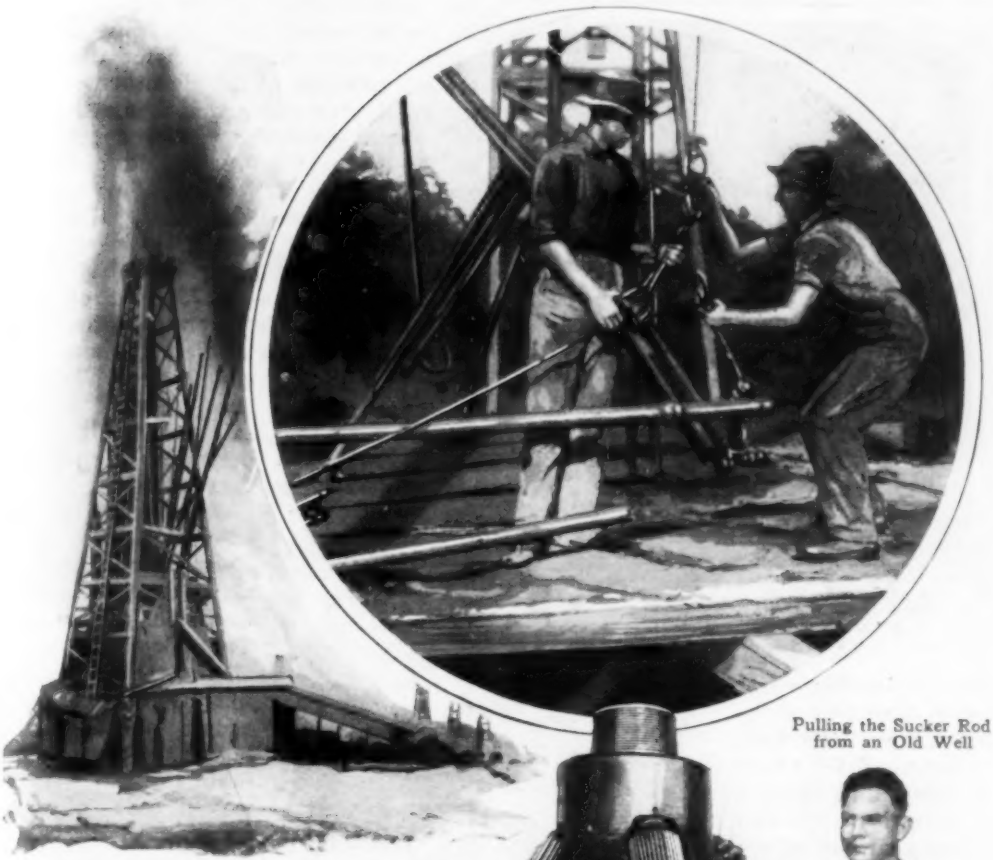
sound. The tools and drill pipe began coming up out of the hole. The men on the derrick floor ran. The man higher up jumped out into space. He chanced to land in a sump hole that was half full of mud and water, and was but slightly injured. The derrick and equipment were strewn all over the surrounding landscape by the gas blowout which followed.

These are mere incidents in the day's work of the oil-well driller. They have been happening ever since Col. E. L. Drake completed America's first oil well at Titusville, Pa., August 27, 1859. That hole was sixty-nine feet deep. It produced twenty barrels of oil a day. Two years ago California gave the world its deepest producing well—E. J. Miley's Athens No. 6. It flowed 1,000 barrels the first day, from a depth of 7,591 feet.

One of the greatest spectacles in the history of petroleum, and one which thrilled thousands of spectators as well as the men who drilled the hole, was staged on the Maricopa flat in central California, seventeen years ago. The Union Oil company took over from a small outfit the Lakeview No. 1, a hole 1,655 feet deep, crooked as a dog's hind leg, and full of battered casing and tools. The stuff in the hole was passed by sidetracking, and the hole was drilled to 2,200 feet.

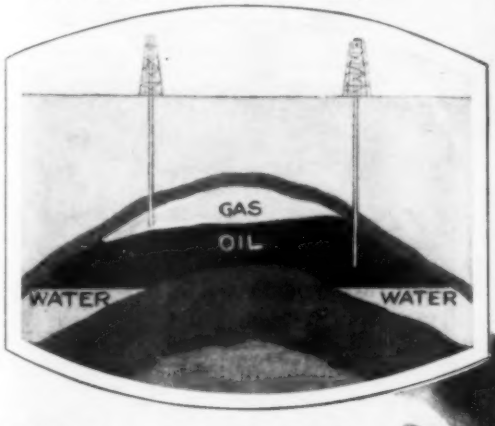
While the crew was drilling ahead, it heard the sullen rumble of gas, and scurried for the open. Quicker than a cyclone takes the roof off a barn, the derrick disappeared. The sky became a black blotch of petroleum, and within an hour rivers of oil were swirling out across the flat desert country, as though there had been a cloudburst. While the well gushed oil several hundred feet into the air, at a rate which was estimated at from 65,000 to 90,000 barrels a day, the oil men grabbed mule teams and scrapers, and built temporary earthen reservoirs wherever a gully promised to hold a few thousand barrels of the golden flood. Finally a high embankment was graded up around sixteen acres, known as "the cornfield," and the oil was drained into it. The company estimated that the well spouted 9,000,000 barrels of oil before it was brought under control.

In the Signal Hill field, at Long Beach, Calif., two crews were recently drilling wells on adjoining town lots. The holes

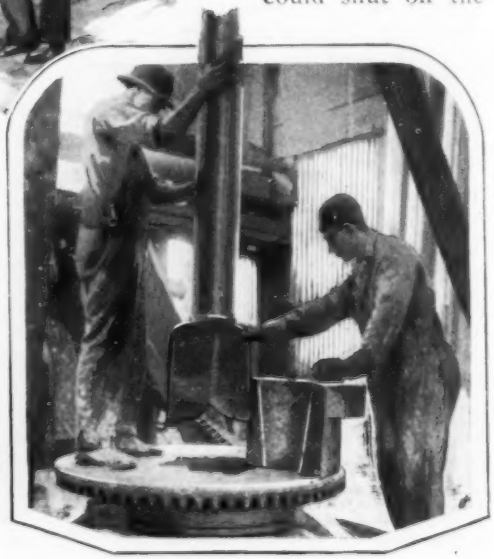


Beginning of the End of the Derrick, When a Well on the Osage Reservation in Oklahoma Developed a Gas Blowout and Started to Collapse

Pulling the Sucker Rod from an Old Well



Showing How Gas Can Be Forced down the Well at the Left to Increase the Subterranean Pressure and Drive the Oil up the Well at the Right; at Right Is a New Style Drill That Sinks and Reams a Twenty-Four Inch Hole, While the Top Rollers Enable It to Cut Its Way Back Up through a Cave-In



Sinking the Well Casing, Above; a New Type of Electric-Driven, Self-Contained Motor Drill, Right, and, Below, Crew Starting a "Fishtail" Rotary Drill down the Hole

were about forty feet apart. One crew, drilling below 2,600 feet, felt the drill stem jumping, and stopped to investigate. It was found that the rotary bit which was drilling the hole on the adjoining lot had drifted over to one side and actually drilled a hole through the side of its neighbor's casing and started down the same hole. The variation from vertical, in the meandering hole, was forty feet in going down about 2,200 feet. When holes are so crooked that the casing gets stuck and cannot be removed, the drillers frequently take a fresh start with the drill, alongside the top of the obstruction. This is called sidetracking.

A bolt of lightning out of a clear sky, when the sun was shining, hit the old Caney well, just south of the Kansas state line, in what used to be Indian Territory. This happened twenty-one years ago. The well caught fire and burned for many days, the gas flow being estimated at 75,000,000 cubic feet per day. A cannon was used to shoot off the elevators resting on the casing which was being lowered when the fire started. After three attempts, one side of the elevator was shot away. A steel dome was then rolled out to a point over the well, but the heat melted the metal. Finally a ratchet wheel was rigged up, and men pulling the attached line succeeded in closing the valve, and the fire went out.

At the edge of Ferry lake, just north of Shreveport, La., a 700-foot oil well blew out and gouged a crater in the earth more than 100 feet in diameter, and then caught fire. The well then began flowing salt water. Many experienced oil men undertook to rig equipment to shut off the gas, but failed utterly. Every time the salt water filled the crater it put out the gas fire. The salt water killed all the timber in that neighborhood, and people took to touching off the gas to evaporate the water, so it was a case of fire, water and gas, lasting for seven years. The state offered to pay $5,000 to anyone who could shut off the

Twisted Ruins of a Heavy Iron-Pipe Line, Which Had Been Buried Underground Before a Leak Caught Fire and Blew the Steel Tubing into These Strange Bends and Loops

gas, but no one succeeded in earning the money. Finally the government took a hand, and put out the fire.

Mexico furnishes one of the most notable instances of a gas blowout. It occurred at Dos Bocas, between Tuxpam and Tampico, in 1909, starting from a seepage of fuel oil to a boiler. This fire burned six weeks, and during that time the well flowed millions of barrels of water near the boiling point. Fluid and flames from this blowout rose 1,500 feet in the air and were visible eighty miles out to sea. The estimated flow of oil per day, from this hole, was 125,000 barrels.

There are many ways to treat oil-well fires and gassers. If the gas pressure is not too great, live steam is sometimes employed to smother such a fire. Occasionally it is blown out by dropping a shot of high explosive over the mouth of the well. Sometimes a well is capped. As a rule each case requires individual treatment and considerable mechanical ingenuity. Fishing jobs, as they are termed, give oil drillers a great many real thrills. Sometimes the drill unscrews itself at the bottom of the hole and falls off. Sometimes the drill collar is lost. Occasionally the bailer drops off and falls into the hole, or some other piece of equipment gets lost in the hole. At such times the crew can only try first one fishing tool and then another (there are scores of different kinds), and keep fishing until it either catches the fish or gives up in disgust, sidetracks the fish and proceeds with a crooked hole. Fishing jobs at 2,500 feet have been known to last several months and occasionally a year, while in a 6,800-foot hole in southern California the crew recently picked up a lost drill collar in thirty-three hours.

If the hole is not too deep, a skillful driller can often tell by the feel of the fishing tools how to carry on such work, but in the deep holes he can only keep fishing and trust to luck. Occasionally, when a solid formation will permit it, the drillers lower a batch of wax or other similar material and take an impression of the condition. From this they can sometimes study the problem and devise some new mechanical method of solving it.

The limit, in fishing jobs, was recently reached at Abilene, Tex., where the Sangor Oil and Refining company, according to well-authenticated reports, employed a human fishhook to save a well. An eighteen-inch hole, down 110 feet, had a bit lost and wedged at bottom. After working for days the crew gave the hole up as lost.

About to turn away, the head driller seized Dick Rawleigh, a little negro boy, who had been looking on. He offered Dick $25 to go down the hole head first and get the bit. Dick was afraid that there were snakes in the hole, but he was finally prevailed upon to tackle the job. The drillers rigged him into a harness, strapped his legs together, and then lowered him head downward, with a cable in one of his hands.

The first trip down he remained several minutes, but failed to hitch onto the bit. After being pulled up and shown how to fasten his line, he went back down with the cable, and that trip he caught the fish, and saved the hole. This incident is recounted by Texans as one of their outstanding heroic episodes of the oil fields.

The drillers generally get a thrill out of the job when they undertake to drill out a shot of high explosive which has been covered by a crumbling formation in the hole. Depths must be gauged to a nicety and tools run with the utmost caution, to avoid drilling into the shell and perhaps exploding it at the wrong level.

The most modern form of oil-well shot is T.N.T., lowered in canisters on the sand line and fired by dropping a "chaser" down the line, or perhaps with a time-clock mechanism in the torpedo itself, or else by an electric spark from a switch controlled at the surface of the earth. Most of these shots are now equipped with the time clocks to explode the charge if other methods fail.

Drilling deep wells nowadays provides special thrills of its own. A few years ago the Standard Oil company drilled a 7,200-foot hole at Santa Fe Springs and got a fine supply of boiling water, but nothing else. The world's record for depth, however, is held now by a Chanslor-Canfield Midway Oil company hole at Brea-Olinda, Calif., which has reached 8,046 feet and will be sunk to 10,000, if nothing happens to the equipment. At that depth a fishing job would be practically impossible, while the danger of one being necessary is very great, as the strain on a rotary drill increases with the length of the drill rod.

Despite the fact that the well has been drilled past 8,000 feet and may go to 10,000, the oil company does not really expect to get oil at such a depth. All it is seeking is a better knowl-

Crater Left Where a Derrick Once Stood; Gas Blew Out the Well, and the Inset Shows It Burning at Night; Fire Is a Constant Menace Which Takes Heavy Toll of Life and Property

edge of the strata two miles down, and some first-class experience in deep-well drilling. At 8,000 feet the temperature in the well reached 233 degrees Fahrenheit, and had been increasing at the rate of one degree each fifty feet.

Deep or shallow—it's all the same. Those who drill oil wells, even as those who go down to the sea in ships, ride with the reaper of souls, and garner a harvest of thrills, perhaps comparable only to those which are experienced by deep-sea divers, firemen, miners, and others who work at hazardous occupations.

ASTRONOMICAL CLOCK CONTROLS CITY'S STREET LIGHTS

Street lamps on part of the system in St. Louis, Mo., are turned on at sunset and off at sunrise by an astronomical clock without the aid of human hand. The instrument adjusts itself to seasonal variations, saving current and eliminating the need of an attendant except for an occasional cleaning. At the proper time in the evening and in the morning, contacts on a drum in the clock operate the circuits which carry the lighting load. In case of trouble, protective relays are provided for every kind of emergency. For inspecting and testing, the system also can be operated by hand.

HOLDER FOR CHECK-BOOK STUBS PREVENTS BLOTTING

Keeping the stubs out of the way while making out checks is often a bothersome task, but the trouble is eliminated by a little spring holder that is easily inserted and quickly removed. It holds the used stubs away from the new one, permitting free entry and decreasing likelihood of blotting.

The House of Pictured Walls in Prague; Designs Were Revealed When Workmen Removed Coating of Paint and Dust

LOST TREASURE OF PICTURES FOUND ON HOUSE WALLS

While at work, not long ago, on the renovation of an ancient building in Prague, or Praha, as the Czechoslovakian capital is now known, repairmen uncovered an art treasure that had long been hidden. The walls of the structure were decorated with skillfully designed figures, producing an effect similar to that on pottery, and, when the outer coatings of dust and paint were removed, the lost pictures were clearly revealed. They had been worked in plaster, a resemblance to bas-relief being obtained by laying a coat of white over one of black and then removing enough of the upper coating to expose the black in the desired designs and patterns.

¶There are more than 22,000,000 automobiles in the United States, or about one to every five persons.

Drawing of Rotary Photo Printer in Use; Arrows Indicate Direction of Turning Table; Light Control in Lower Front Panel

ROTARY PRINTER FOR PHOTOS SAVES TIME AND EXPENSE

For photographers, a rotary printer, fitted with six 100-watt lamps and a pilot light, makes 900 prints an hour and is adjusted to give exact alinement and perfect margins with little trouble. The lighting is controlled by a cranking device, and a fan keeps the negative from curling and the plate glass cool under continuous printing. The entire outfit can be run in or out of the workroom at will so that there is no lifting. It is said to do the work of five or six hand printers.

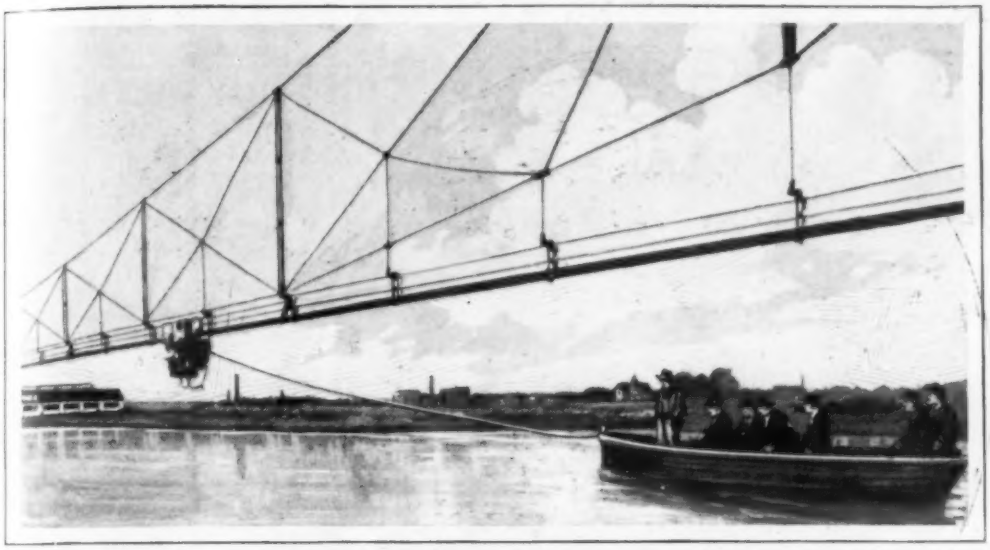
COAST-TO-COAST AIR MAIL IN DAY PROMISED SOON

Loss of but one business day on air-mail deliveries between the Atlantic and Pacific coasts is the aim of the post office department, and realization is promised as soon as the last leg of the route, between Salt Lake City and the Pacific coast, is lighted. That will permit planes to leave at the close of the business day instead of in the morning, and to deposit mail on the opposite side of the continent in time for early delivery on the second morning. Under such a schedule, Saturday night's mail from New York would get the same service to the Pacific coast as to Brooklyn, and San Francisco would have as favorable delivery to New York as to Oakland. During the fiscal year ended June 30, 1926, government-operated routes carried 353,641 pounds of mail, and 2,256,137 miles were flown, nearly a million of them at night. Receipts have been increasing at such a rate that the total for 1927 promises to double that of 1925. According to Postmaster-General New, the authorization of individual contracts for transporting the air mails greatly stimulated commercial aviation and led to an extension of the service. The government is now considering a route down the Atlantic coast for direct service between Boston and the tip of the Florida peninsula, with possible extension to Cuba.

MILLSTONE USED IN MEMORIAL TO REVOLUTIONARY HEROES

Stones from an old gristmill have been employed in a monument to Revolutionary War soldiers at Honesdale, Pa. One forms the base against which a bronze tablet, bearing the names of the men, has been placed, and part of the foundation for the upright section is formed by a second stone. The grooved surface of the upper one produces a decorative pattern about the tablet.

Old Gristmill Stones Adapted to an Artistic Purpose; Revolutionary War Monument at Honesdale, Pa.



As the Monorail Tug Would Appear over Water; the Experiments Were Conducted with a Boat Load of Persons on a Grass Plot, and Proved Successful

AERIAL MONORAIL OVER CANAL TO PULL CANAL BARGES

Towing barges by a motor car suspended from a monorail over a canal or at one side, is the interesting system tested recently in Germany. During the experiments, a boat load of passengers was dragged over a smooth grass plot to show how the outfit would perform when put to work with water barges.

MARCONI SEES NEW RADIO ERA IN SHORT-WAVE BEAMS

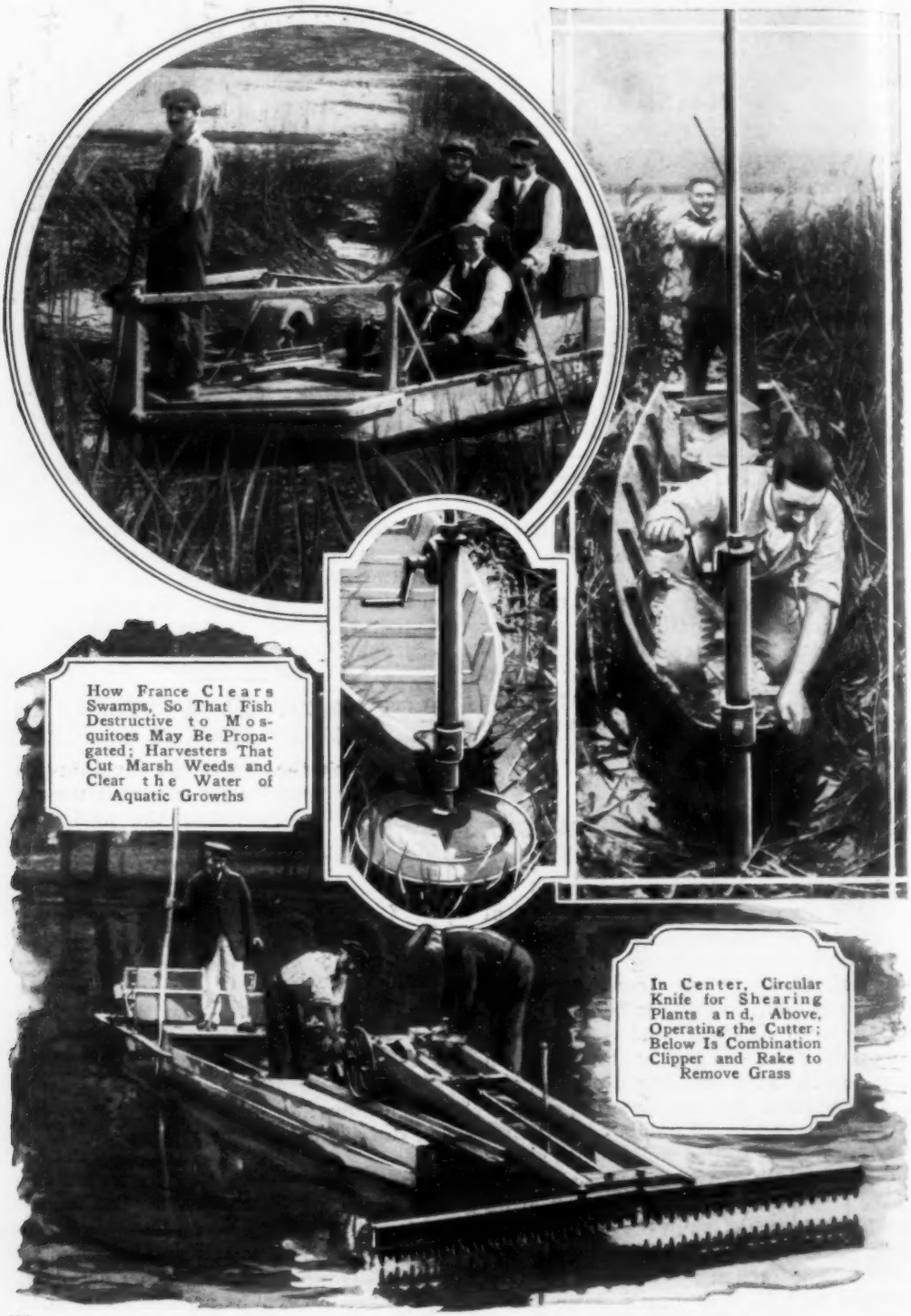
Short-wave wireless, sent around the world in a narrow beam by his system of directional aerials, will revolutionize radio communication, according to Senator Marconi. Beam transmitters have already been installed in England to connect Great Britain with Canada, South Africa and Australia. The short-wave station, which needs much less power because the signal is concentrated in one direction instead of being spread to all points of the compass, can be installed and operated for about one-tenth of the cost of long-wave wireless, with the result that it will bring considerable reduction in the cost of sending messages. The powerful beam, which can be sent immense distances even in daylight and without much static interference, also promises to help solve the problems of wireless picture transmission and, possibly, television, according to the inventor. The beam apparatus is shielded on one side by a curtain of wires which blanket that side, so that signals go in only one direction.

BLOTTER TIP ON FOUNTAIN PEN HELD BY POCKET CLIP

Fitting on the end of the fountain-pen cap and secured by the clip that fastens to the pocket, a number of little blotters are always available just as an eraser is provided for the pencil user. They are in layers, so that a new one can easily be exposed and, besides absorbing ink, the cushion they form helps protect the pen cap against breakage.

¶The Popular Mechanics Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by the Bureau.

AQUATIC HARVESTING MACHINES RECLAIM SWAMPS

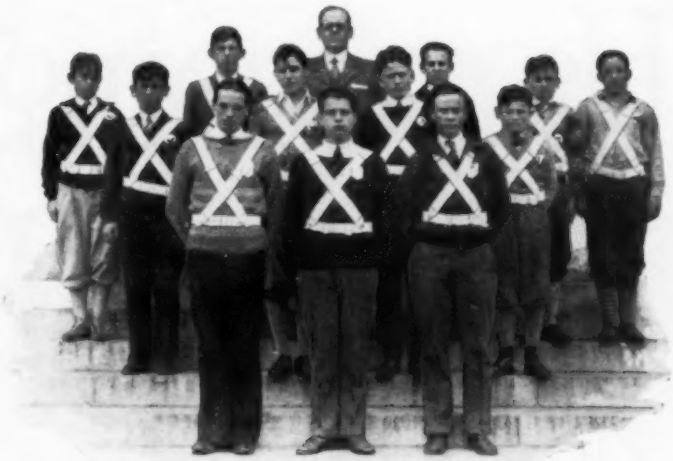


How France Clears Swamps, So That Fish Destructive to Mosquitoes May Be Propagated; Harvesters That Cut Marsh Weeds and Clear the Water of Aquatic Growths

In Center, Circular Knife for Shearing Plants and, Above, Operating the Cutter; Below Is Combination Clipper and Rake to Remove Grass

WHAT IT MEANS TO RUN A TRAIN

In the popular mind, the engineer of a train has little to do but keep his eyes on the track and his hand on the throttle while the fireman shovels coal. In reality, their jobs involve much more than this, as is shown by a survey of a 200-mile run on an eastern railroad. A careful count was kept and revealed that, on the trip, the crew performed 5,123 individual acts and expended thirty-eight foot-tons of effort: The steam throttle was operated 928 times; whistle, 268; brake valve, 90; blower valve, 1,100; air fire door, 945; bell ringer, 200; sand leech, 80; right injector, 700; left injector, 30; water-gauge tests, 30, and equalizing brake and discharge valve, 752. Besides all these activities, there was the road to watch and all its signals.



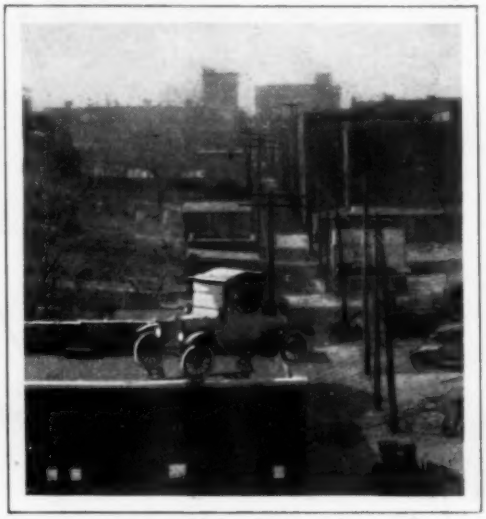
Squad of Schoolboy Traffic "Police," Appointed to Keep Order When Classes March from One Room to Another

SCHOOL'S OWN TRAFFIC POLICE KEEP ORDER IN HALLS

A squad of student traffic policemen has been appointed at a high school in Boston to keep order and prevent loud talking while classes pass through corridors from one room to another. The force is under the supervision of the principal, but has its own officers. The members wear distinctive belts and shoulder straps on duty.

SECRET OF SWIFTER AIRPLANE SOUGHT FROM TROPIC FLY

Airplane designers have turned from study of the gull and the soaring eagle to a Brazilian fly for suggestions that may lead to faster aircraft. The insect is about the size of a bumblebee and is said to fly at the rate of 815 miles an hour, about half as fast as a rifle bullet. An American naturalist, standing beside a canyon in Brazil, was attracted by the insect when he saw it flash past him, a blur of orange. Search revealed that it was a variety of deer fly. Engineers are now studying the streamlines and motive plant of the insect.



Out of Date but Still in Service; Ancient Auto on Roof as Repair Shop Sign

SECONDHAND AUTO ON ROOF SERVES AS SHOP SIGN

As a substitute for the usual painted or lighted sign, an automobile-repair man in a western city placed a secondhand car on the roof where it would attract the attention of passers-by. The auto was no good for further service and cost less than a new sign, saving more than could have been realized had the car been sold for junk.

¶One of the products of petroleum is glycerin.

Harnessing Life's

IF you toss a penny once or a hundred times, the chances are exactly equal that it will fall with either head or tail uppermost. But at the end of your hundred tosses, or a thousand or a million tosses, the total number of heads and the total number of tails are sure to be almost the same.

That last fact is the basis of the law of averages, a curious rule that can be applied to picking a site for a store, stocking it with goods, planning restaurant meals, selling insurance and a hundred and one other activities.

Most everybody knows that insurance rates are decided from elaborate calculations based on past experience, a system of averages by which the company can bet with surety not on your life—for you are like the penny tossed once, and may either live or die—but on the average lives of a vast number of people, a whole day's tossing of the penny as it were. But would you believe that, when the restaurant chef serves corned-beef hash with poached egg on Friday, December 11, he knows just how many orders to prepare, because his past records tell him how many customers the restaurant will have on that day and date, and what proportion of them will want corned-beef hash with poached egg? The records of a large hotel or restaurant show just that. By consulting them, it is possible to order a day or two in advance the ingredients of every dish to be served, with assurance that the amount will not be far out either way.

That chain stores, particularly those dealing in cigars and drugs, have a habit of being found on

More People Will Walk Down One Side of a Street Than Will Patronize the Other, So the Chain Stores Get the Average Totals before Picking a Location for a New Establishment

Strangest Law

When the Weather Man Reads His Recording Thermometer He Is Contributing to Tables of Averages Used by Many Merchants

the best business corners in town practically everyone has observed, but do you know why? Their location is not a matter of chance, but one of careful calculation. They first make actual counts of the number of people passing a given point, and then, from past experience and the law of averages, calculate what proportion of the passers-by would be customers, and even what their average expenditure each day would be.

If you were entering the millinery business you would be told by manufacturers that you should have in stock only a small percentage of women's hats that are large and a great number that are small. If you sell ready-made clothing, you will be told to stock a certain percentage of stout sizes for fat men. If you are selling shoes and doubt the advice given you by the manufacturers, you might play a little game by way of testing out the law of averages. Stop, say, 500 persons on the street at random and ask them the size of their shoes. Then, in order to try out the law, go to another city or to another street, and ask another 500, and your answer will check up with the advice of the shoe manufacturers, and the two streets will give you the same results. All because each 500 will have practically the same percentage of people who wear number nine shoes.

To get a working understanding of the law of averages for your own purposes, for your own home, you begin by keeping records. It is certain that the accurate knowledge possessed by life-insurance companies is all a matter of accurate records. It may be that Lloyd's will take a risk as to the weather on a certain day when a championship fight is to be held out of doors. The promoter is obliged to choose a holiday in order to attract the largest crowd. Next he goes to his insurance broker and takes out a policy covering his loss, should it rain. The insurance company in turn asks the weather bureau for data covering some fifty years of records as to the state of the weather, say, on Labor day. On the basis of the records, the company is bound to win in the long run. It is protected by the law of averages.

And speaking of the weather, what is apparently more fickle? "Every time you plan an outing it rains," you say, but it is far more likely that the records of the weather bureau will show that your

chance for a clear, pleasant day will be pretty generally even.

The weather bureau of every city in the United States is being constantly used in order to help business. Recently a great company making electric fans sent to all its agents throughout the country elaborate charts which, based on forty years' records, told just when to advertise fans, when to stock up and how many days of the year fans would be expected to sell. This was all based on weather conditions—humidity, rainfall, heat, and so on.

Insurance Companies Know from the Law of Averages Just About How Many Automobiles Will Be Wrecked This Way

Newspaper publishers are showing an uncanny understanding of the law of averages in relation to the weather. They have learned, for instance, that a newsboy will sell 149 papers on a clear Sunday morning, but when the weather threatens to be disagreeable they will print more, for the same boy will sell 211. Thus the weather report means more than a mere announcement each day.

Then there are the department stores. They have a sale planned which must attract a certain number of people in order to dispose of a certain quantity of goods. "But what about the weather?" inquires the manager of the advertising director. Either the weather bureau or past store records will be consulted, while the advertisement stands ready to be run on last-minute orders. But, strange as it may seem, it is not the downright rainy day that worries the management so much as a stormy or threatening morning. In fact, according to the law of averages, Mrs. Jones will sally forth on a fair morning to buy through the lure of the newspaper bait. Should she, however, encounter a shower along about noon, she will decide to stay in town to eat her lunch and, because she has nothing else to do, will buy more merchandise than if the day had remained clear.

On the morning of April 3, 1917, men smoked more cigars than usual. All that day they continued to consume large numbers of cigars. In fact, Tuesday, April 3, was a record-breaking day for cigars all over the United States. This was really most surprising because, as a rule, Tuesday is a dull day in the tobacco business. According to the law of averages, men stock up on Saturday and replenish on Monday. The reason was that on the previous night the president had appeared before a joint session of congress and delivered his message asking for a declaration of war. The next day men read their papers and became more thoughtful. Much ordinary business was forgotten and men were inclined to smoke and talk and sit and think. Thus the law

of averages throughout the nation was proved by the conduct of all the men.

In St. Louis is a well-known hardware firm that is constantly making some use of the law of averages. For example, each day they take the little stacks of sales slips that come in by mail from the men on the road and weigh them. Thus they know without further study, just how much money the sales represent. Each ounce of the little slips means so many dollars. One slip may be for a bill of goods mounting into thousands, and the next may cover a quarter's worth of nails. But two equal stacks of the slips average a certain amount which, experience has shown, varies but a few cents.

People Who Leave Their Change Contribute an Average of Twenty Dollars a Day to the Circus, the Law Reveals

This same company gathers all sorts of other information because it has found that each has its place in the successful operation of business. For example, they ask their men to send in daily reports on the weather, temperature, rainfall and on crop conditions. They even arrange to get information on the state of the weather in England. In getting this, they are merely obtaining advance knowledge as to certain business that the law of averages assures them will be theirs in time. For an unusually warm, rainy spring in England will mean an earlier demand on English manufacturers for pruning shears, scythes and such articles. This in turn will mean that the manufacturers will be less able to make prompt shipments of such goods to America. Wholesalers in this country, therefore, must either get their orders in early or arrange to get the goods from some other source.

Also a rainy March and April in any section of the United States means that there will be a big demand for scythes and sickles and lawnmowers in June. Under the law of averages, a certain number of men out of each thousand will buy lawnmowers, but the number who get new ones depends upon how luxuriously the grass grows. Just so a dry spring and sales of garden hose have their relation.

In the treasury department at Washington there is a man who plays with the law of averages and obtains answers to legislative questions which will affect the whole United States. This man is Joseph S. McCoy, who is listed merely as an actuary, yet, although not in the public eye, he takes a set of figures and another lot of numbers and puts them together according to the law of averages and so finds out what you and your neighbors will do as regards income taxes, tariff and a lot of other things.

When the Underwood tariff bill was being drawn, McCoy was called upon to give information as to the way people would pay the various amounts. The congressmen wanted to know just how much money the bill would bring in. It happened that on one item the tax was

ten per cent and some had planned on increasing it to thirty per cent. It was McCoy who estimated with wonderful precision how much the tax would bring in and whether a certain item could be made to bear the higher or the lower tax.

Then congress wanted to know what the population of the United States would be in 1910. They asked in 1901. And when the census was completed it was found that McCoy came within one per cent of the count. At other times McCoy was asked regarding the number of men who belonged to clubs when a tax on clubs was being considered, and regarding the people who go to the movies. His answer to these questions was simple. He inquired of every man that he met to how many clubs he belonged, if any, and he asked his wife how often she went to a movie and asked her to ask her friends. Thus, by counting on human nature in Washington, he was able to learn what women in Kansas and California would do. His estimate as to those who go to the movies was that 12,000,000 people do each day. Some of the motion-picture producers at first disputed his figures, but when they checked up by their own records, they admitted that he had obtained an accurate estimate.

When you go to the circus, you and all the others will contribute about $20 a day because you go away from the ticket window without your change. Circus men have found out that these walk-aways are worth that much to them and they count on it. But the bigger the crowd and the more excitement, the more change will be left. In many cases it is the habit of people to do certain things that have made men and women, able to appreciate the fact, rich.

The cigar store and the chain drug store can tell from year to year what their losses will be as judged by the weather. A certain velocity of wind will mean so much and rain will mean so much. According to the weather, they know how many men will use the telephone; therefore they place the instruments so that people must go through the store in order to reach them and, perhaps, be induced to buy something they see in passing.

Photos © Nat'l Photos

Uncle Sam Knows Just What He Can Expect to Find Each Year in All the Packages Sent to the Dead-Letter Auctions for Sale, as a Result of Figures Compiled over Many Years

X RAY STOPS THEFTS OF DIAMONDS AT MINES

Workers in the South African diamond mines are easily foiled by means of X-rays when they swallow choice stones in an effort to steal them. The rays reveal the diamond as it registers on the photograph. Another method the miner-thieves sometimes attempt is to hide a gem in a deep cut on their feet. By giving the workers six months vacation each year, less dissatisfaction has arisen and consequently fewer attempts at stealing, according to a representative of the South African government.

ELECTRIC TOASTER BORN OF "HIGHBROW" TESTS

Not long ago, learned investigators were engaged in laboratory tests, trying to determine which metal burned up at the slowest rate under the strain of carrying an overload of electricity. No one knew at the time, but these experiments were to give the world the electric toaster. The heating element in these units so successfully resists the current that it lasts a long time and has made the toaster a practical household aid. Academic arguments over electricity and other matters are still in progress, and the results, while not all adaptable, are often applied for the general good. Some scientists believe that the electron can be still further divided into systems of its own and the opposition offered to their arguments recalls that, for a long time, scholars held the atom to be the smallest particle of matter, but have now abandoned that theory in view of the evident structure of atoms in negative and positive charges.

Now Used as a Summer Residence; the Country Church with Front Veranda Remodeled into Vacation Home

STONE CHURCH IS REMODELED INTO SUMMER HOME

Abandoned by the congregation, a New York church, built of native field stone, was purchased and remodeled into a summer home. The structure was altered but slightly on the exterior and the inside was divided into rooms and fitted with modern conveniences.

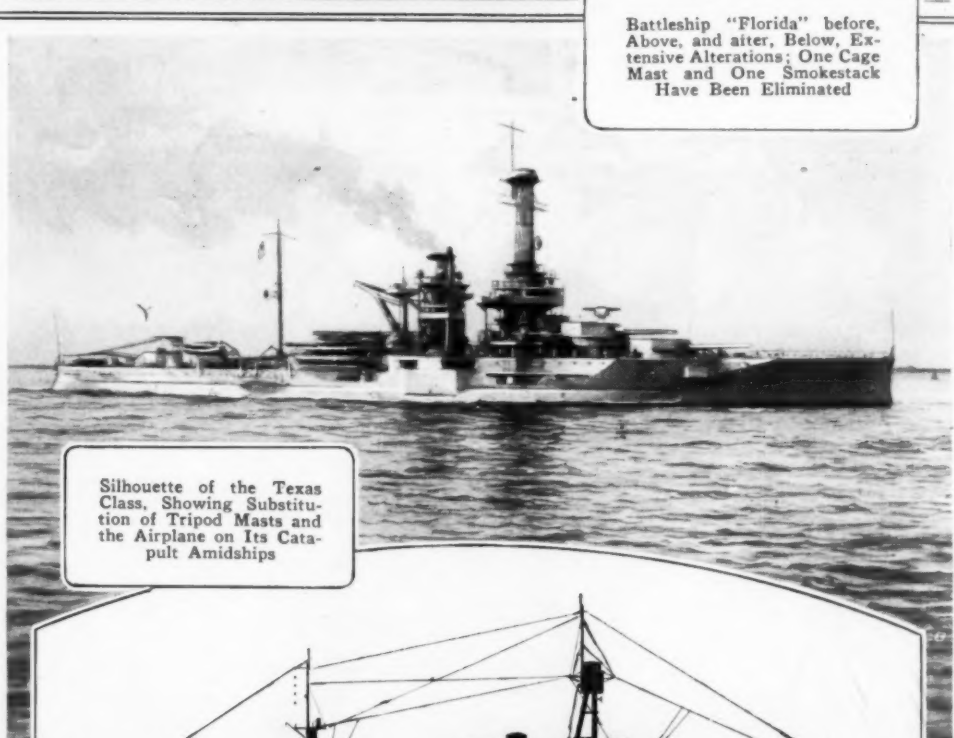
Curving Lashes with the Curler; Gentle Pressure Applied for a Moment or Two Is Sufficient

EYELASH CURLER IS THE LATEST BEAUTY AID

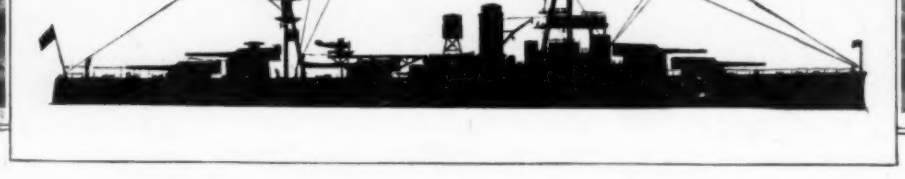
Without heat or cosmetics, the eyelashes can be curled by a simple hand instrument that clamps them between soft pads. By application of gentle pressure for a moment, it bends them into a curl that will last for days.

TRIPODS TO REPLACE CAGE MASTS ON BATTLESHIPS

Battleship "Florida" before, Above, and after, Below, Extensive Alterations; One Cage Mast and One Smokestack Have Been Eliminated



Silhouette of the Texas Class, Showing Substitution of Tripod Masts and the Airplane on Its Catapult Amidships



OLD WARSHIPS ARE REBUILT TO MAKE LONGER CRUISES

To keep abreast of the times, radical changes have been made in the equipment of three United States battleships and alterations are in progress on three others. The "Texas," "Arkansas" and "Florida" have been remodeled. The "New York," "Wyoming" and "Utah" will be ready for duty in their new form in a few months. The modernization program, when completed, will increase the cruising radius of the six ships to that of the other twelve battleships of the fleet. The "Texas" was converted from a coal to an oil burner, additional plating was placed on the protective deck as defense against aerial bombs and high-angle gunfire, a powder-impulse catapult was installed for launching airplanes, "blisters" were added to the underwater hull for submarine, bomb and mine protection, and the mainmast was removed and replaced by a low mast just forward of the number three turret, while a new tripod mast was installed between turrets three and four. There is now but one smokestack instead of two and the cage or latticework masts have been replaced by tripod masts.

BLOOD PUMPED BY ELECTRICITY AFTER HEART STOPS

Possibility of prolonging life by artificial circulation after the heart and lungs have ceased to function is seen as a result of experiments by Russian investigators, who have devised an electrical apparatus that takes over the duties of the natural organs. Blood was kept flowing through the severed head of a dog for half an hour. During this time, signs of life were noticed, such as opening of the eyes, reaction to light and movements of the ears.

Double-Purpose Weapon for Police, the Combination Flashlight and Revolver, to Surprise Criminals and Aid in Firing

FLASHLIGHT AND GUN IN ONE TO AID CRIME WAR

To throw light on the target, a revolver is fitted with a strong flashlight. The weapon is intended especially for police use against marauders in the dark.

HANDLES FOR WOMEN'S HATS LATEST LONDON FAD

To save the crown of the brimless women's hats now in vogue in London, stiff felt handles have been attached so that the hats may be more easily removed. They are made to harmonize with the other trimmings.

The light from Sirius, the dog star, is equivalent to about forty times that given off by our sun.

Ceremonial Kiva, or Round House of the Ancient Pueblo Dwellers. After the Ruins Have Been Excavated and Partially Restored; the Southwest Indians Were the First Apartment-House Builders

Digging Up History with a Pick

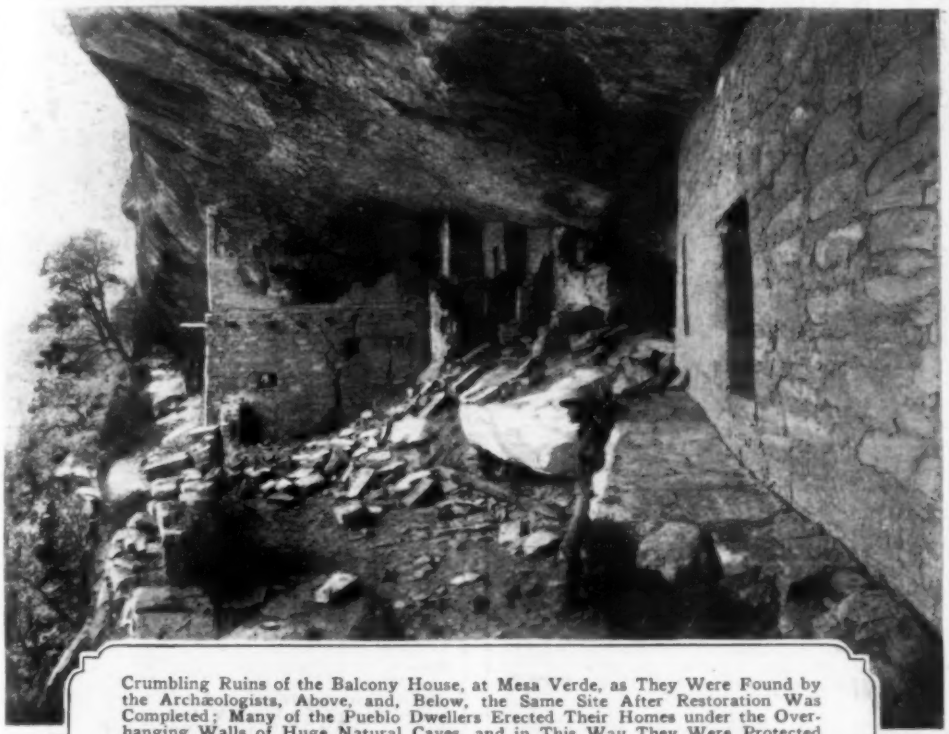
DOWN in the southwest they dig up their unwritten American history with a pick, dust it off with a whiskbroom and piece it together bit by bit like the fragments of a broken pottery bowl.

The direct descendants of the ancient Pueblos are still living in the region, almost as primitive a people as their forefathers. Many of them are employed during the summer to work on excavations of the ruins of their former homes. Of their prehistoric ancestors they know nothing except a few legends. It is up to the scientist in charge to write the history of these forgotten peoples from the relics of their life and customs which they left behind them in the abandoned villages.

An archæologist approaching a site which he intends to excavate, first makes a detailed description, with photographs, of the undisturbed ruins, measuring the area of the mound and the height at various points. From the appearance he estimates the original height of the walls, the number of rooms in each group with the location of kivas, or circular council chambers, and the ground plan of the village. He collects all fragments of pottery which he can find on the surface and then engages a crew of Indian or Mexican laborers to do the excavating.

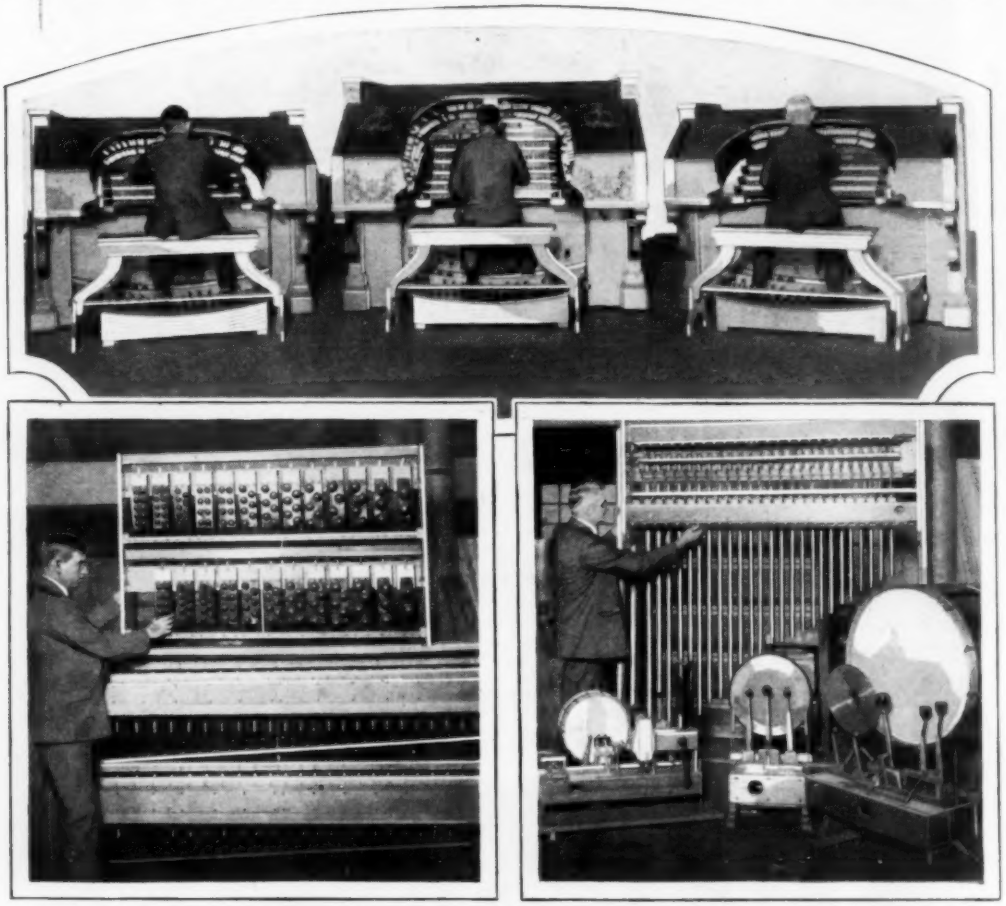
The workmen first clear off the loose stones left exposed on top of the mound. These they pass along from hand to hand to a spot outside the mound proper where they will be piled, perhaps for restoration purposes later on. Then the men start to work with picks, shovels and wheelbarrows to clear out the earth that covers the ruins. They brush off every scrap of pottery, bone or wood. If the rooms are to be left open, the "bone diggers" carry off the filling of earth and stones.

The archæologist usually digs out a burial site himself. He works slowly with a trowel and inspects every bit of dirt removed. He uncovers the bones with a soft brush, replaces pottery and other mortuary offerings surrounding the body and photographs the remains. From such discoveries he can tell not only the stature, age and sex of the person buried, but something of the culture of the times in which he lived.



Crumbling Ruins of the Balcony House, at Mesa Verde, as They Were Found by the Archæologists, Above, and, Below, the Same Site After Restoration Was Completed; Many of the Pueblo Dwellers Erected Their Homes under the Overhanging Walls of Huge Natural Caves, and in This Way They Were Protected from the Complete Ruin That Befell Homes in More Exposed Sites; the Caves Not Only Gave Protection from the Weather, but Limited Attack to the Front

INVENTING SOUNDS TO INTERPRET MOVIE DRAMAS



Playing the Three Consoles of the Mighty Organ, All Parts of One Unit, and Some of the Instruments It Contains, Sleigh Bells, Chimes and Sets of Drums

Tones that tell stories are the pipe organ's contribution to the movies. Its hundreds of voices are the result of many experiments by skilled musicians and craftsmen who are constantly seeking new effects and combinations for better interpretation of the films. This is illustrated in the instrument for Roxy's theater in New York, the largest unit organ ever built for a playhouse. Its resources are so vast that three organists are needed to operate it. For this purpose, it has three specially designed consoles or key desks. Many tones impossible to the ordinary organ are produced by this instrument, which is essentially a great organ and an orchestra in a single unit. One set of pipes plays the peculiarly shrill tones associated with oriental music and dancing, and the note of the post horn, a special trumpet often used with the tallyho coach, is also reproduced. The organ contains a complete set of drums and traps for symphony or jazz music and every known percussion instrument including the piano, marimba, celeste, xylophone, chimes, orchestra bells and harp. Sleigh bells are seldom heard in the streets, but this organ contains a whole set of them, which are jingled by the action of small bellows. Special trap effects to fit scenes in the pictures afford realistic imitations of an aeroplane, train, automobile horn, siren and many other objects. Practically every tone color of the symphony orchestra can be reproduced. The organ is of the electro-pneumatic type, that is, electricity is used to convey the impulse from

t[illegible] key and compressed a[illegible]s the power by which t[illegible] mechanism that pro[illegible]ces the tones is oper[illegible]d.

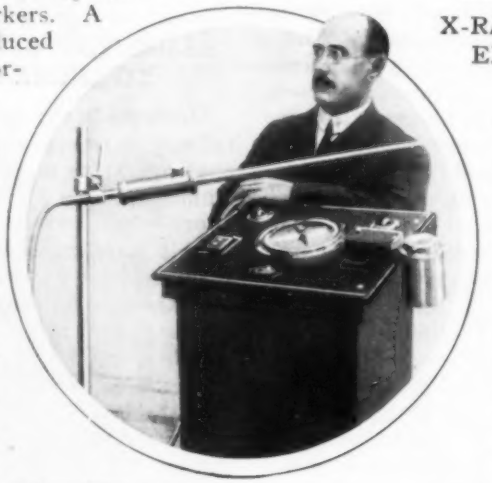
EFFECTS OF HEAT ON WORKERS

Several time-honored ideas have been shattered and the importance of maintaining proper atmospheric conditions in factories, foundries and mines has been emphasized by tests conducted by the bureau of mines and the public-health service as to the effects of heat on workers. In the course of the tests, it was discovered that a robust man, stripped to the waist, could work for an indefinite period without injury in a temperature of ninety degrees Fahrenheit with a relative humidity of 100 per cent. Another experiment showed that drinking ice water in large quantities after long exposure to high temperature and great exertion was not harmful. One man drank a quart in fifteen minutes without any injurious effects. The investigation also revealed that sweat dropping into the eyes is a common cause of optical trouble among workers. A small quantity introduced into the eye, when normal, caused the organ to become sore and inflamed and perspiration from the arms and chest was found to be even more harmful. The experimenters recommended that workers who are exposed to great heat wear sweat bands to protect their eyes. The tests were conducted in laboratories and carefully constructed rooms.

Trapped by the Camera; Flashlight Photo Young Deer Took of Itself When It Stepped on Hidden Trigger in Brush

DEER TAKES OWN PHOTOGRAPH WITH HIDDEN FLASH

Carefully concealed in the underbrush, a camera and flashlight registered an excellent photograph of a young deer feeding in the Pocono mountains of Pennsylvania. The flash was sprung by a trap hidden in the leaves. Similar photos are not uncommon, but few show the subject at such close range and accurate focus.



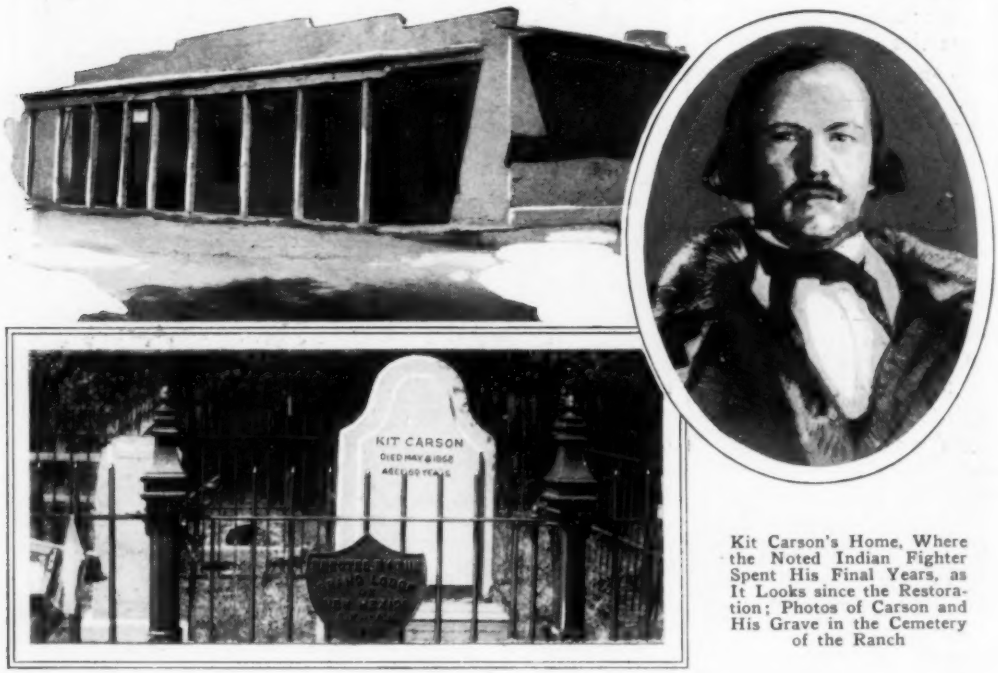
© Henry Miller

Dr. Strauss of Vienna with Gauge by Which He Measures the Intensity of X-Rays

X-RAY GAUGE MAKES EXPOSURE SAFE

To prevent injury to patients through exposure to X-rays of too great intensity, a gauge devised by a physician in Vienna shows the strength of the rays being used and how much of them has been consumed in a treatment. The instrument is intended not only to safeguard the patient but also to reduce waste of the precious rays.

FRONTIER DAYS LIVE AGAIN IN KIT CARSON HOME



Kit Carson's Home, Where the Noted Indian Fighter Spent His Final Years, as It Looks since the Restoration; Photos of Carson and His Grave in the Cemetery of the Ranch

Restoration of part of the home of "Kit" Carson, scout, plainsman and Indian fighter, at Taos, N. Mex., has revived interest in one of the most romantic figures the west has produced. Three men of his day stand out in history—Buffalo Bill, Jim Bridger and Carson—and because of his unusual prowess as a marksman and his daring as a scout, the latter, though he died in 1868, is as well known as Col. Cody himself. Long before the first gold miners rushed overland to California, Carson had gained his place as the most famous man among all the trappers from the Mississippi to the Pacific and from the Canadian line to the Mexican villages in the south. Born in Missouri, he went west at the age of eighteen, in 1826, accompanying a party of traders down the Santa Fe trail. From that time on until his death, he spent practically all his life in the heart of the Indian country. His ranch at Taos, where he made a few brief visits between almost continuous Indian wars, became the rallying point for the scattered white settlers whenever they were threatened by the Apaches, so the restored house has historical interest aside from having been his home. When Carson and his wife both died, in 1868—his death the result of privations while fighting on the Union side throughout the war—the place was allowed to fall into decay. Rain and wind gradually eroded the adobe walls, so that, so far, only three of the ten rooms the ranch house contained have been restored.

ALUMINUM STREET-CAR BODY TO INCREASE SAFETY

Decrease in the operating costs of street-railway systems and greater safety for passengers are foreseen in a street car of aluminum. All parts except the windows, doors, wheels, axles, springs and gears are of this material in an alloy said to be as strong as steel but only one-third as heavy. The windows and doors are made of plate glass, which has proved effective in automobile service. In manufacturing the cars, the alloy is heated until it has the consistency of jelly, then it is forced through dies that give it the desired shapes. A car exhibited in Cleveland, Ohio, weighed only 34,000 pounds, about four tons less than the ordinary steel car

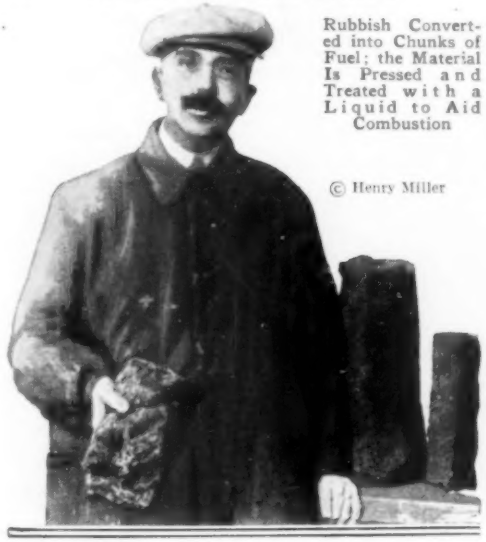
of the same size. According to officials of the railway company there, this reduction in weight will effect a saving of fifteen per cent in the consumption of electric power, or an economy of some $150,000 in Cleveland every year.

ONE BUILDING ACCOMMODATES CHURCH AND APARTMENTS

Convenience and simplification of the financing problem are sought in a combination church and apartment building constructed in an Ohio city. The auditorium, Sunday-school rooms and other church departments are in the front portion and the living quarters at the rear. Rentals from the apartments are expected to cover all the interest and deferred payments on the church debt and, when this has been cleared, will provide a steady income. The apartments have been arranged in such a way that they can be converted into additional church quarters when the need arises. The minister and his family will occupy one suite.

SYNTHETIC COAL FROM RUBBISH CUTS FUEL COSTS

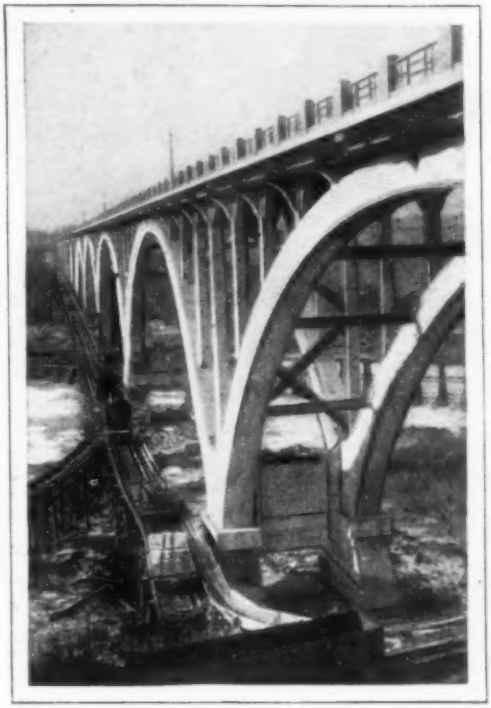
Rubbish, old shavings and other waste are treated with a special liquid and pressed into bricks for fuel by a Viennese chemist. The pieces are said to give a hot fire and a wagon load of the material can be obtained for a small price.



Rubbish Converted into Chunks of Fuel; the Material Is Pressed and Treated with a Liquid to Aid Combustion

© Henry Miller

MEMORIAL BRIDGE OF CONCRETE NEARLY MILE LONG



Concrete Arches of the Memorial Bridge between Fort Snelling and Mendota, Minnesota

Dedicated to Minnesota gunners who lost their lives in the World War, the concrete bridge, between Fort Snelling and Mendota, over the Minnesota river is 4,119 feet long and 200 feet above the surface at the center span. Exclusive of sidewalks, it has space for five lines of vehicles abreast. The foundations extend to solid rock at an average depth of eighty feet below the ground level. The viaduct will be of great service to persons in the southern part of the state by making Minneapolis more accessible.

DECK FOR CHILDREN ON LINER SIMPLIFIES TRAVEL

Caring for small children while on ocean voyages has been simplified on two steamers in the New York-California trade by the addition of a special deck for the youngsters. Here they can play games, dig in sand boxes and otherwise amuse themselves in safety under the supervision of an attendant.

German School Boys Depositing Money in Classroom Bank; Amounts Are Registered on Card

BANKS IN SCHOOLROOMS HELP PUPILS SAVE MONEY

School children of the United States banked more than $20,000,000 during the last school year, official reports from the 11,371 schools where savings systems have been instituted, show. The sum represents the deposits of more than 4,000,000 boys and girls, or eighty per cent of the total enrollment in places where the system is in operation. According to W. Espey Allig, of the American bankers' association, the plan was, in a large measure, the outcome of thrift inspired during the World War. In many Berlin schools, automatic banks have been installed as an incentive to the youngsters to save. Each child has a card for registering its deposits and, when a certain amount is reached, a city savings bank credits the sum to the child on its account.

PNEUMATIC STREET-CAR WHEEL STANDS HEAVY TESTS

Promise of improved street-car service is seen in a pneumatic wheel which has withstood severe preliminary tests in Baltimore, Md. It consists chiefly of an inflated rubber tube in a metal container around the hub of each wheel, the weight of the car being borne by the tube, which does not come in contact with the rail. Heavy pressure tests failed to break the rubber. Engineers believe that the wheel, if successful, will permit further improvement in the adoption of roller bearings, a feature which has not been practical because of the jolts and jars. Savings of power are also anticipated.

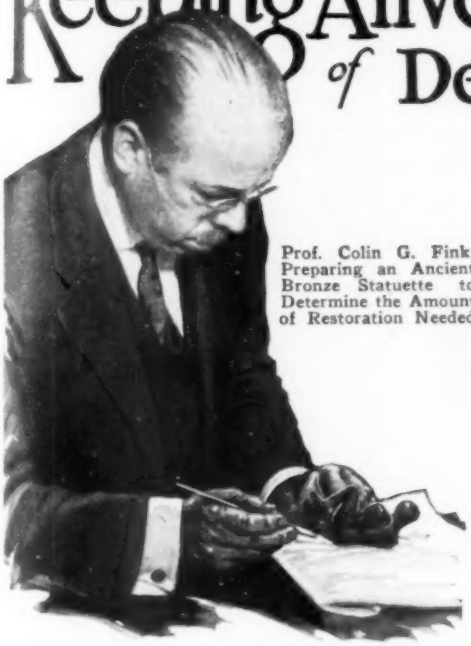
AUTO HAS CATERPILLAR TREAD FOR TRAVEL IN MUD

Automobile and tractor are combined in a car introduced in England. It has a caterpillar tread on each side and is lowered or raised by the motor. When it is in contact with the ground, the main wheels are elevated and the car is propelled by the tread.

When Caterpillar Unit Is Lowered, Main Wheels Are Elevated and Car Is Propelled by Tread; the Change Is Quickly Made Back to the Big Wheels for Ordinary Travel

Keeping Alive Art Treasures of Dead Centuries

By JOHN CHAPMAN



Prof. Colin G. Fink, Preparing an Ancient Bronze Statuette to Determine the Amount of Restoration Needed

ASK your doctor if he knows how to keep a mummy in good health. Or a stone tomb. Or a bronze warrior. He will want to know what the joke is, and may remark that such things don't get sick.

But at the world's greatest storage house of "dead" things, the Metropolitan Museum of Art in New York, one of the big problems is a constant battle with disease, and an expert staff is kept constantly at work detecting and preventing ailments which may cause the ruin of priceless art treasures. Years have been spent in this research and, only recently, cures and preventives have been found that will preserve exhibits for a longer time than has heretofore been possible. The experts say the difficulty is not in finding exhibits but in maintaining their health after they are brought to our unfriendly climate.

A sick hawk is now under observation in the office of the curator. It is a beautiful bronze thing, priceless, and older than Christianity. The nearest it ever came to being alive, except perhaps in the imagination of some worshiping Egyptian, was when it was molten metal. It lay preserved for centuries, but the unhealthful American climate has been too much for it, and now no physician visiting his millionaire client could give a more thorough examination than the curator gives the hawk every day.

There is a little pin point of decay on one of the bird's bronze feathers. It is the dreaded bronze disease—a kind of cancer. Just what causes it is not yet exactly known, but it is contagious, and one case of bronze disease may threaten the life of other unprotected exhibits. In seeking a cure, the Metropolitan called in Dr. Colin G. Fink, of Columbia university, who has developed almost magical methods for the restoration of apparently hopelessly corroded ancient treasures.

Bronze disease shows itself by a fine green dust at the base of the platform on which the exhibit is mounted. The grains are so fine that unless the bronze is incased in glass they will blow away. Thus comes the contagion. If such dust is found, the bronze is minutely examined, and an area, sometimes no larger than a pinhead, spotted where the bronze is rough in appearance and lacks the beautiful luster which perfect metal shows.

How bronze disease starts has not yet been determined, but Dr. Fink has noted that when a speck of lampblack or coal soot is placed on a clean sheet of copper, the speck soon becomes the center of a corroding area. He believes it may be caused by a trace of sulphuric acid in the carbon speck; or it might be the action of one of the constituents of the atmosphere, such as ammonia.

In Dr. Fink's process against bronze disease, as well as with restoration of corroded bronzes, the object is hung in a weak solution of caustic soda by means of soft-copper wires. The negative pole of a direct-current lighting circuit is attached to these wires, and the current is applied, the positive poles being iron objects hung on either side of the bronze. Under the electrical influence, a layer of spongy copper takes the place of the dis-

Bronze Head from Ancient Greece Being Placed in the Vat for Electrolytic Treatment to Restore the Original Metal

eased spot, and this is brushed off. Then the bronze patient is given a coating of lacquer, which does not change its color, but must be renewed every four years.

Ancient finds for museums do not usually arrive in a perfect state of health. Many of them have been victims of chronic disease for centuries, and the change often aggravates these ailments and cuts short the lives of the exhibits.

Bronzes present one of the biggest problems. Often, archæologists will find a perfect specimen like the hawk, which develops no ailment until it has been on exhibit for years. More often, bronze statues, ornaments and utensils are in an apparently hopeless state of corrosion when discovered.

Old Egyptian bronzes have been buried in peat mud, water or Sahara sand. Those found in peat mud are well preserved. Water bronzes are slightly corroded. It is in bronzes dug out of the earth that most trouble is encountered. Egypt was once an ocean bed, and its sandy soil is filled with salts, the action of which causes corrosion. Such bronze has been found to have an outer porous green crust which is not bronze at all, but copper, silver, tin or lead compounds. Beneath this, there is usually a core of copper oxide, which is smooth and still bears most of the imprints of the creating artist's handiwork.

Before scientists took up a detailed investigation, the outer crust was often knocked off by mechanical means, or taken off with acid which might injure the precious smooth metal beneath. Now, with Dr. Fink's process, the outer crust is cleaned off by electric action, and the

Bronzes, before and after Restoration, Showing an Egyptian Statue and a Dog and Its Family; Center, Prof. Fink with a Completely Corroded Bronze Made in Egypt 3,000 Years Ago

metal core within revealed. In this way, bronzes that have been completely corroded and have no trace of their original alloy, have been restored to beauty.

A corroded bronze object is hung in the electrolytic bath until free emission of gas indicates that the corroded part has been broken down into porous copper. Now comes the ticklish part. After a careful washing, the object is examined, and if it looks as if there were hard metal beneath the copper sponge, the sponge is wiped off with a soft brush. If it is apparent that corrosion has gone all the way through and there is no bronze beneath, the object is rapidly dipped into weak nitric acid, and then into water.

When the smooth oxide surface stands revealed, with much of the long-dead artist's craftsmanship engraved thereon, the object is treated with a chemical which gives it the beautiful color of ancient bronze, and dried in an oven. Then a lacquer covering is applied.

Nearly everyone has seen in some museum beautiful iridescent glass—perhaps a relic of buried Pompeii, or an Egyptian tear vase. This glass, which has taken its iridescent sheen through centuries of burial, may quickly decay when brought to light, due to the condensation of water from the atmosphere. Such glass must be given a protective coating before it can be exhibited.

Even stones from supposedly imperishable tombs will waste away in unhealthful museum atmosphere unless preventive measures are taken. Limestone is most apt to have a chronic disorder which, if not cured, will cause the stone to crumble away to ruin. The source of the ailment is again traceable to salts in the earth. These salts penetrate the body of the stone, and moisture will bring about decay.

When the museum receives stones from some buried tomb, the surfaces to be preserved are treated with a special solution. Then the stone is carefully lowered into immersion tanks so that the surface to be preserved is barely out of the water. Days and weeks of soaking, with frequent changes of water, gradually draw out the salts. Then the stone is dried, and soaked in paraffin until it will absorb no more. Often a section of a tomb will absorb several hundred pounds of melted paraffin.

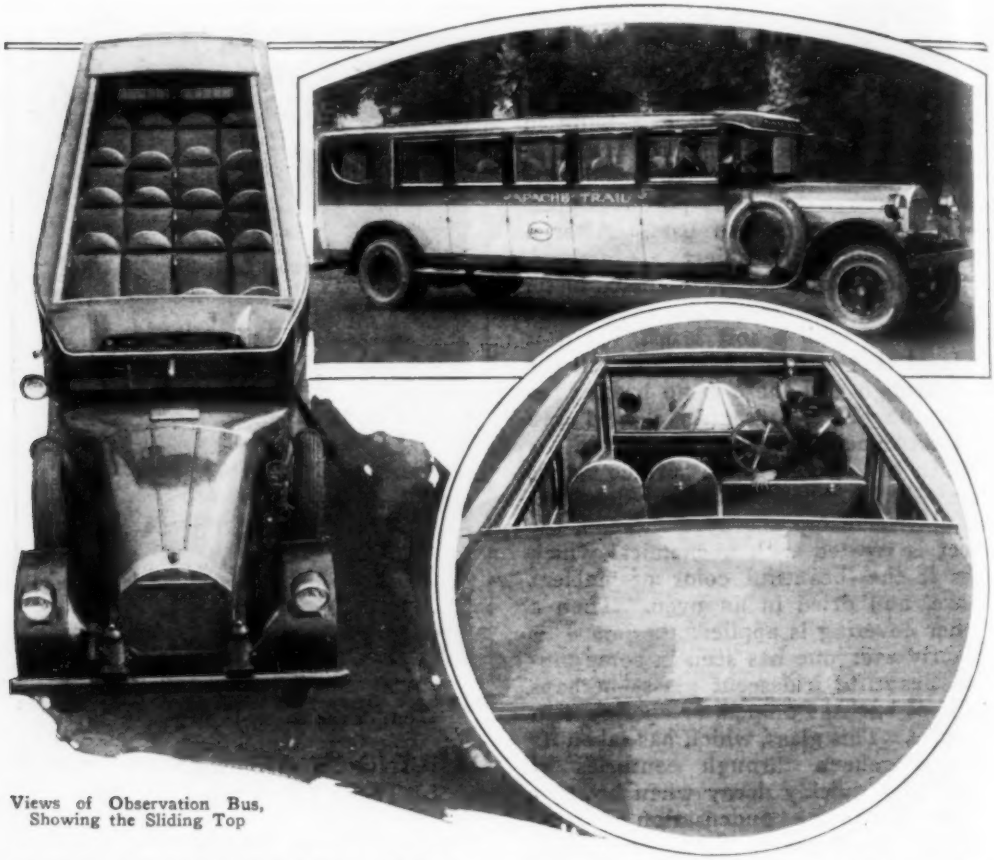
Enjoying a Dance in Airplane at Altitude of 2,000 Feet; Music by Phonograph or Radio

DANCING IN AIRPLANE'S CABIN LATEST TRAVEL LUXURY

Dancing among the clouds is now almost a literal reality on the air line between London and Paris, for there is a small ballroom space in the cabin of one of the new ships where passengers may enjoy themselves during the ride. The photograph was taken at 2,000 feet.

HIDDEN SAFE IN WALL OR FLOOR RESISTS THIEVES AND FIRE

For installation in homes or offices, a safe with removable lock boxes, can be almost entirely concealed as it has no protruding parts. The tumbler lock has more than 130,000 combinations which may be changed in a few seconds by a simple adjustment. To further protect the safe against damage by fire it is insulated with asbestos.



Views of Observation Bus, Showing the Sliding Top

SLIDING TOP ON MOTOR COACH GIVES OVERHEAD VIEW

Tourists are able to enjoy an unobstructed view of the scenery along the Apache trail in Arizona from a motor coach with a top that slides back, converting the vehicle into one of the open type in a few seconds. The roof is made in sections of light steel. The units are operated by chains with a crank controlled by the driver. When pulled back, they rest over the baggage compartment. At the slightest indication of stormy weather, the driver can crank the three moving sections back into position above the passengers. Reclining seats also aid the occupants, as they permit an upward look without discomfort. The sliding top has been designed to eliminate rattling regardless of its position.

Sensitive Recording Instrument Which Registers Irregularities in Machine Movement, Helping to Locate Trouble

THRILL INDICATOR ALSO TELLS MACHINE TROUBLES

Irregularities in the motion of machines of almost any kind are registered on a sensitive "thrill" indicator so that inspectors may detect trouble and make adjustments before a breakdown. The unit pictures action in a tabulated code on a strip of paper, and any abnormal jars or vibrations are clearly shown. The indicator is also adapted to the study of movements of the human body.

GLACIERS GROWING IN EUROPE TO LOWER TEMPERATURES?

That the earth's temperatures may be affected by the increase in the size of glaciers in the Alps, is the possibility advanced by a French scientist. From a series of measurements, it has been determined that glaciers in French Savoy have been advancing seventy to 150 feet a year and have gained in volume from 15,000,000 to 250,000,000 cubic feet at the same time. Some of the huge masses of ice are 600 feet thick. One of the most interesting glaciers is the Bossons, the central one on Mount Blanc. Instead of advancing in a mass, it has an oscillating movement, going forward first on one side then on the other and in the middle, like a heavy man who throws his shoulders forward alternately as he walks.

STOP METER FOR AUTO TESTS STRENGTH OF BRAKES

Accurate measurements of the efficiency of the auto brakes can be taken with the aid of a small meter, which is placed level in the bottom of the car or held firmly against some convenient support. Readings are taken on a dial which shows, by numbers, in how many feet the vehicle would have stopped had it been moving at a speed of twenty miles an hour when the brakes were applied. In making a test, the auto should be run at between fifteen and thirty miles an hour and then brought to a full stop. The reading is taken when the dial momentarily pauses. The instrument can be read when a stop is made from ten miles an hour. It is of handy size and weighs about one pound.

¶The Popular Mechanics Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by the bureau.

Sculptor Standing beside Heroic Statue of Washington, Shown in Dress of a Civilian

WASHINGTON IN CIVILIAN DRESS PORTRAYED IN STATUE

Almost all statues of George Washington show him in military dress, but a monument recently unveiled in Portland, Oreg., departs from the tradition in that it displays the father of his country in civilian attire. The bronze statue is ten feet high, and is the work of Pompeo Coppini, a New York sculptor.

LIGHTED HOUSE-NUMBER PLATE HELPS PROTECT HOME

Easily installed and illuminated by current from the doorbell circuit, a lighted house-number plate is visible at all times, aiding callers and also helping to guard the premises. No expensive conduit is necessary as wire may be run from the reflector to the bell transformer, and the light operates at so small expense that it may be left going day and night.

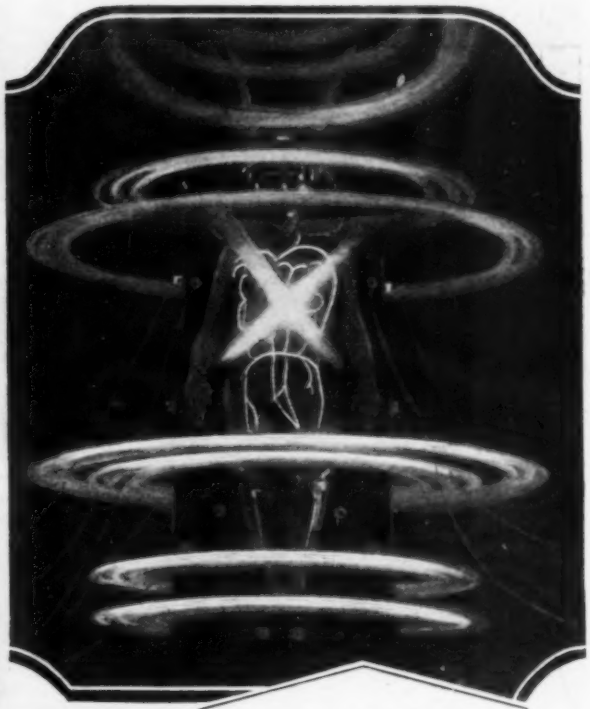
FEATS OF SCIENCE HELP MOVIES GIVE VIVID

A New German Film, Based on the Old Robot Story, in Which a Mechanical Person, Created by an Inventor, Becomes a Frankenstein Monster, Has Been Produced in Germany, Utilizing Novel Electrical Effects in an Unusual Manner; at the Left Is the Mechanical Woman, and, Above, the Heroine, Who Is Imprisoned in a Glass Cage and Used as a Model by the Crazed Inventor; Below He Is Seen with the Model and His Own Creation Taking Porm in the Background; a Tesla Coil, Producing Artificial Lightning Effects, Transmits Glowing Brush Discharges along the Wires Leading from the Cage

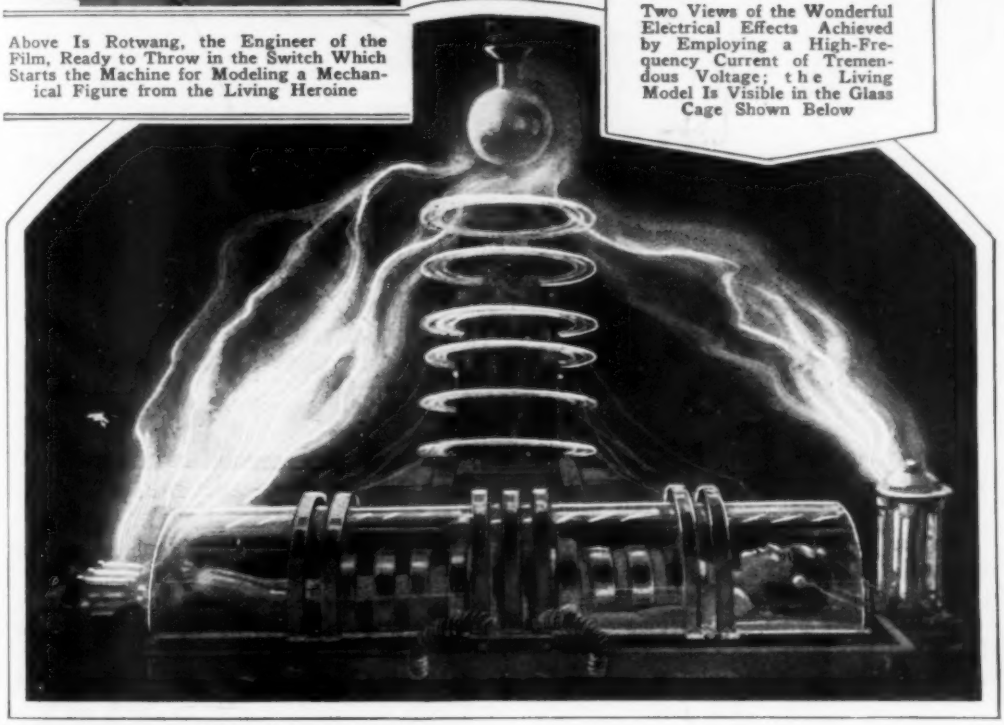
Courtesy

PICTURE OF A WORLD RULED BY MACHINES

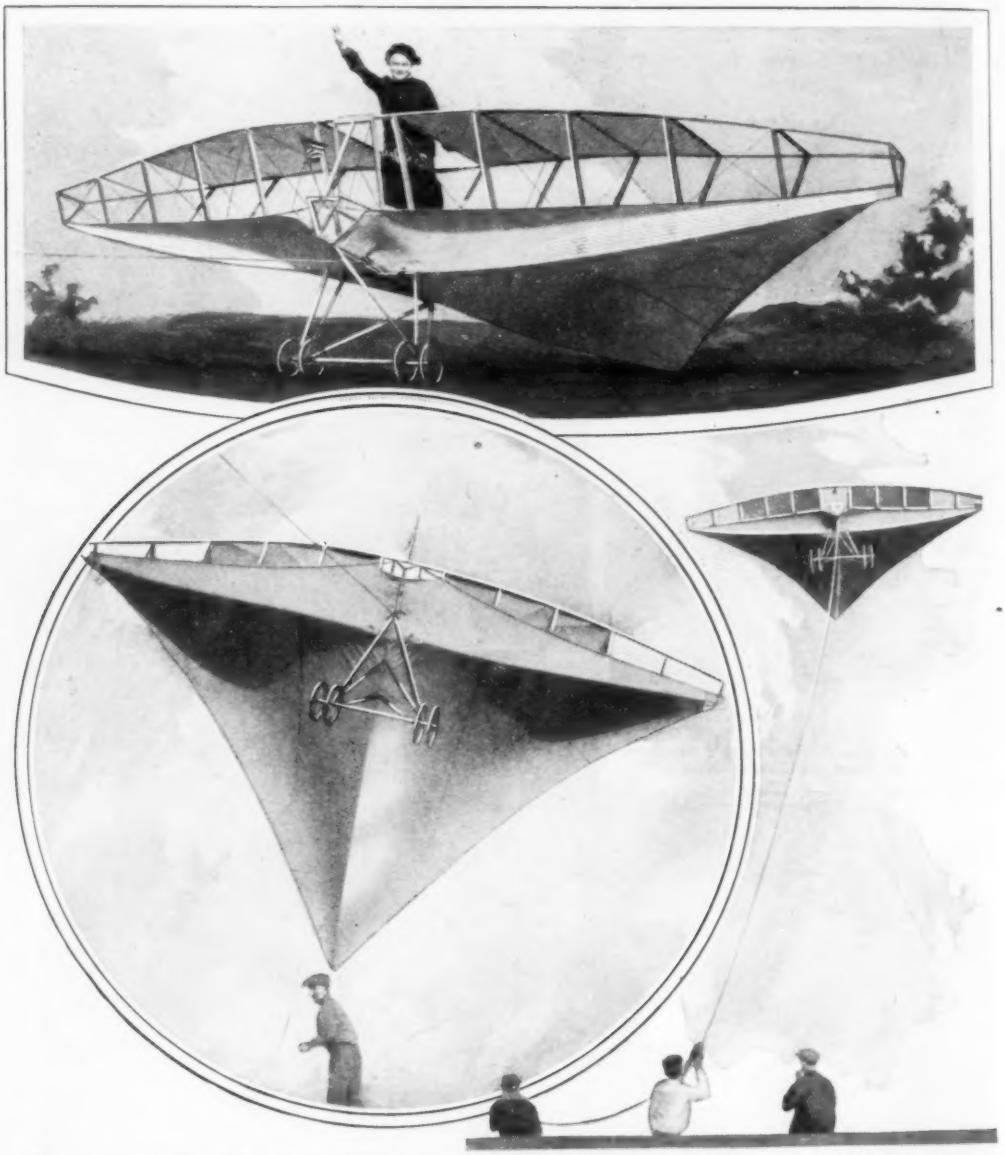
Above Is Rotwang, the Engineer of the Film, Ready to Throw in the Switch Which Starts the Machine for Modeling a Mechanical Figure from the Living Heroine



Two Views of the Wonderful Electrical Effects Achieved by Employing a High-Frequency Current of Tremendous Voltage; the Living Model Is Visible in the Glass Cage Shown Below



MAN-CARRYING KITE IS STEADIER THAN BALLOON



Demonstration of the Kite's Strength and Views of It in Flight; More than 200 Successful Trials Have Been Made with It, Lifting 186 Pounds

Steadier in the air than a balloon, and less easily damaged, a huge kite devised by a western craftsman has been tested for observation purposes. It is said to have lifted 186 pounds. One of its useful features is that it maintains a nearly stationary position when aloft. More than 200 trial flights were made with the kite and, according to the testers, its maximum capacity for load-lifting has not yet been reached.

Among possible uses suggested for it are included the taking of aerial photographs where a flying machine is not available, and, for observations during actual warfare, it would be able to carry an airman to a sufficient height to get information, while the kite would not present as

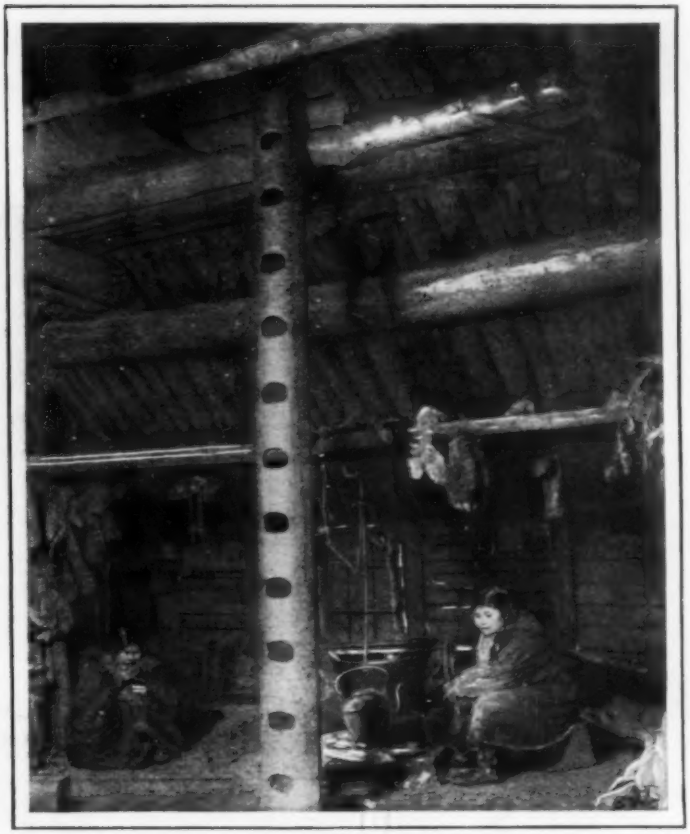
big a target as the ordinary balloon. It has a wheeled carriage and bracing on the upper part similar to those of a plane.

AUTO "PEP" COMES HIGH

More than one-fourth of the gasoline which the motorist buys is used to obtain a quick get-away, according to Prof. A. C. Willard of the University of Illinois. In the average automobile, the maximum power is realized when the carburetor is set to mix twelve pounds of air with one of gasoline. This, however, is not the most economical mixture, as there is not enough air to burn all the gasoline. The most economical mixture, the one in which all the gasoline is consumed, is when sixteen pounds of air are mixed with one of gasoline. Demanding "pep" rather than economical operation, the motorist sets his carburetor to give the "one-twelve" mixture, even though, in so doing, he sacrifices twenty-five per cent of the heat value it is possible to get out of the fuel.

PENCIL HELD BY FINGER CLIP TO PREVENT LOSS

Keeping the pencil always in readiness for use, a clip holds it to the finger and yet permits free use of the hand for other purposes. It is intended chiefly for messengers, clerks and draftsmen, fits either the right or left hand, and prevents the annoyance of mislaying the pencil, which usually happens when it is most needed.



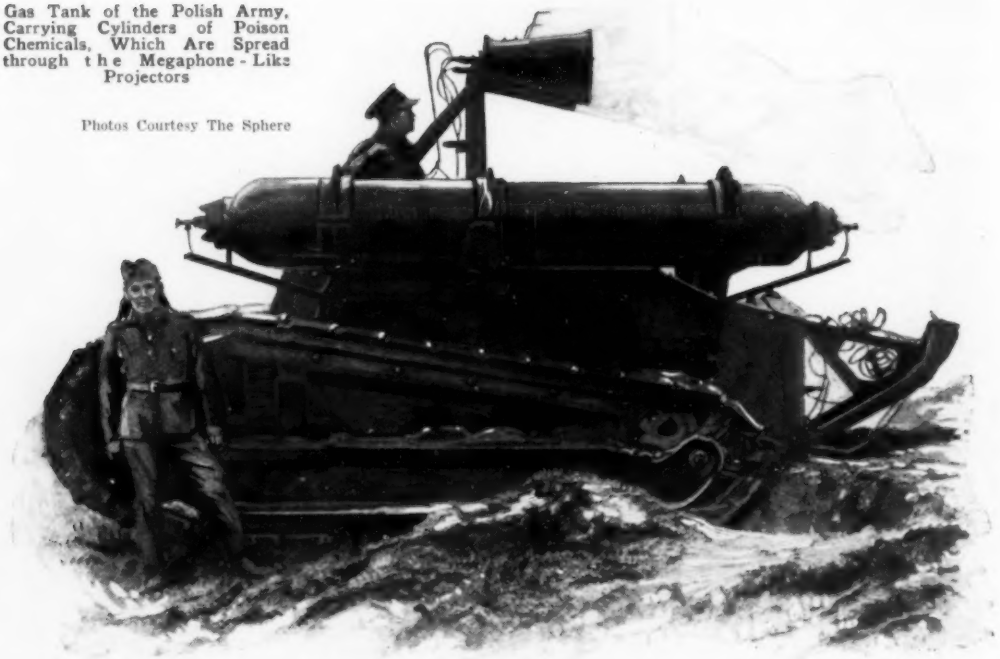
Interior of Home in Far North, Showing the "Staircase," a Split Log with Holes for Climbing Up and Down

HOMES NEAR TOP OF WORLD HALF UNDERGROUND

Dwellers along the Pacific shores of northeastern Asia, near the Arctic circle, and in other parts of the frozen north, have strange houses partly above and partly below ground. The cellar portion is shielded from the cold and warmly lined. A feature of these abodes is the ladder stairway. It is simply a split log with holes in it for hands and feet.

COLORED SAILS ON ICE BOATS REPLACE NUMBERS

Instead of using numbers to identify the ice boats of a racing club, the sails were dyed different colors. The plan proved effective, as the boats could be distinguished at a considerable distance and the differences in shades were also registered on photographic plates.



Gas Tank of the Polish Army, Carrying Cylinders of Poison Chemicals, Which Are Spread through the Megaphone-Like Projectors

Photos Courtesy The Sphere

Gasoline Cavalry Displaces Horses

British One-Man Tanks, Armed with Machine Guns, Are Capable of Traveling Thirty Miles an Hour

DAYS when armored knights went forth to battle on steel-clad horses were revived recently when the British army demonstrated its newest weapon, one-man tanks, to replace cavalry horses. Equipped with both caterpillar tread and rubber-tired wheels, either of which can be placed in operation at will, the little tanks are capable of making thirty miles an hour on smooth roads, and can go any place that a horse can be ridden, and get there much quicker.

Added to that advantage, the cavalryman on the gasoline steed is completely sheltered behind bullet-proof steel, and instead of a rifle or sword carries a one-man machine gun capable of firing more than 100 shots a minute. Unlike the unwieldy hand rifle, the machine gun, securely mounted on the tank, can be operated while charging at full speed.

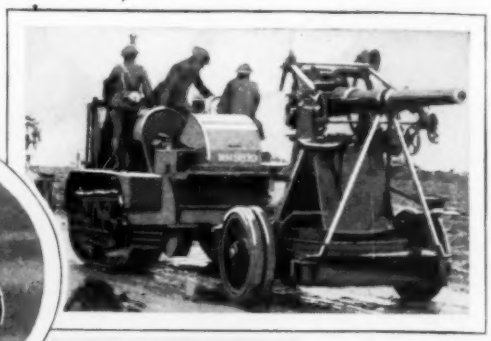
On a road or over smooth ground, the baby tanks ride on three rubber-tired wheels and are steered by motorcycle-type handlebars, operating the single small wheel in the rear. When the wheels are raised and the caterpillar tread brought into action, the same handlebars do the steering in the same way that an ordinary caterpillar truck is managed.

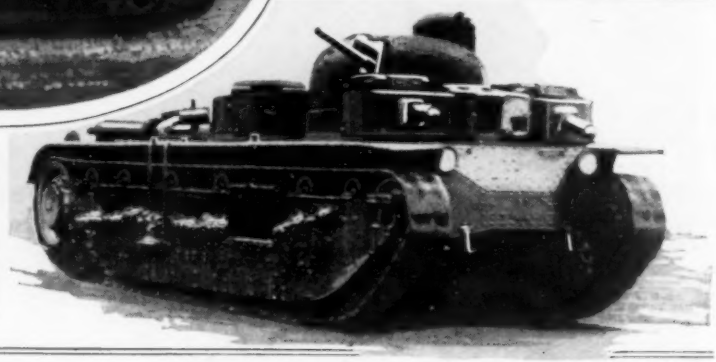
Demonstrating the gasoline cavalry before a meeting of the dominion premiers, the British army also brought out all its latest big tanks. There were giants mounting five revolving turrets, four with machine guns and one armed with a three-pound gun. They were real moving forts, bigger and better armed than anything used in the late war, yet capable of surprising speed and able to go anywhere and over any kind of country.

Another regiment of the big forts carried the latest type of anti-aircraft guns, mounted to fire at high angles and capable of sending shrapnel shell against enemy planes thousands of feet up in the air. In

"Gasoline Cavalry" of England, Mounted on One-Man Tanks, Advancing to the Attack at War Games Played before the Dominion Premiers; Note Anti-Aircraft Tanks in the Rear

between the big tanks and the baby cavalry, were whole companies of two-man





Small Two-Man Tank, Above, and at the Right, a Movable Fortress, the Great Five-Turret Battle Tank; Above It Is a Tractor Tank Hauling a High-Angle Anti-Aircraft Gun

tractors, carrying heavy machine guns and with one man to operate the tank while the other tends to the gun.

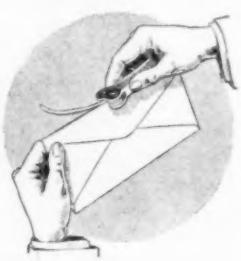
The caterpillar tread also was applied to all forms of army transport. In one display, a big field gun was dragged along by ten horses, while the gun crew trudged behind, making two and a half miles an hour. Past the plodding horses flashed huge tractors, pulling the same type of gun at thirty miles an hour, with the entire gun crew riding the tractor, so that, in actual war, they would arrive at the battlefield fresh and sound instead of tired out from a long march.

Batteries of anti-aircraft guns mounted on rubber-tired wheels followed, drawn by fast tractors. After them came staff cars, standard touring cars and limousines, except that their rubber-shod wheels could be lifted clear of the road by lowering a caterpillar tread, so that they could cross any kind of rough ground and go through ditches and trenches with the same ease as a tank.

Gasoline armies are attracting more and more attention in all the European countries. Recently the Polish army brought out a new form of tank carrying huge steel cylinders on its roof, each filled with poison gas under tremendous pressure. Above the cylinders, a pair of megaphone-like horns release the gas and send it out in dense clouds. Leading an infantry attack, it is thought the gas tank might put most of the enemy out of action, so the soldiers following it would only have to "mop up" and take over the trenches.

HAND-POWER LETTER OPENER SAVES OFFICE TIME

For the office where the volume of mail does not justify the installation of a power letter opener, a hand-operated unit is worked on somewhat the same principle as the larger machines and is said to give satisfactory results. It consists of an arrangement of sharp steel cutters and a disk that is fitted against the edge of the envelope. To slit the container, the opener is simply run along the edge after it has been adjusted. There is no danger of damaging the contents.



CROOKEDEST RAIL LINE WILL BE AUTO ROAD

Steps have been taken to transform the Mt. Tamalpais and Muir Woods railway, in California, into a motor highway. The line, known as the "crookedest in the world" because of its 287 curves, was built in 1896, to make available to tourists the scenic panorama visible from the top of Mt. Tamalpais, and, for years, the little cogwheel engines have chugged their way to the summit without an accident or interruption in service. The guest books in the tavern at the beginning of the line, show that persons from practically every country in the world have made the trip up the mountain on the tiny, twisting railroad. It will be reconstructed into an auto toll road, as it is thought that such a thoroughfare will be of greater service.

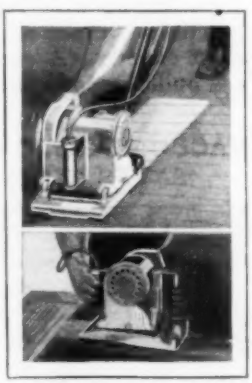
Giving the Elephant Seal Its Morning Ration of Fish; the Three-Ton Creature Has Been in Captivity Less Than a Year

THREE-TON ELEPHANT SEAL FED FROM KEEPER'S HAND

Most seals in the zoos have to swim for their food, but the 6,000-pound elephant specimen in San Diego, leans leisurely against the fence and swallows its meal of fish directly from the keeper's hands. The huge creature was captured about a year ago on Guadalupe island, off the coast of Lower California.

VACUUM SANDER IS PORTABLE AND ELIMINATES DUST

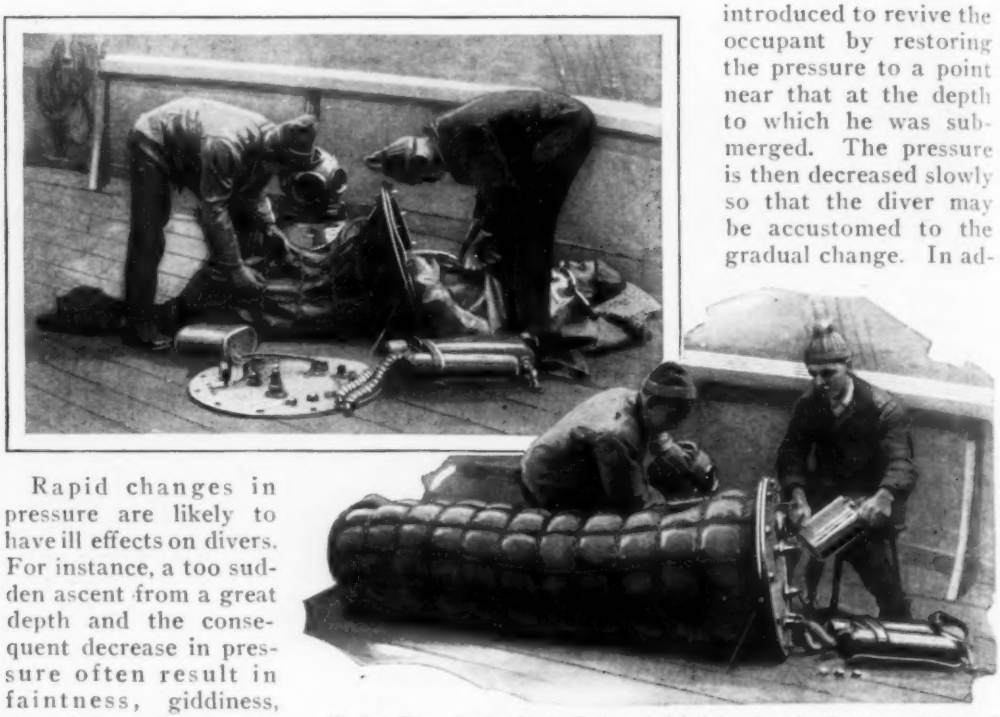
Operated from an electric-light socket, a portable sanding outfit is equipped with a vacuum unit which takes up the dust and also prevents clogging or gumming, as when used on old varnished floors, desks or other furniture. It is especially adapted to new floors, but will perform all classes of work from heavy-duty roughing or planing to the finest finishing, the manufacturers assert. It weighs only thirty pounds and the motor is designed for power and long life.



WHY WOMEN ALIGHT BACKWARD

The tendency of women to alight from a street car or other vehicle while facing to the rear is explained by an eastern scientist on the grounds of heredity. He declares that when our ancestors sat in trees, the mother carried her offspring on her left hip with her arm around it, leaving the right arm free for protection. This fixed habit has been retained through the ages so that now, when a woman instinctively loads her left arm with bundles, the right hand is free, but since the exits are almost always on the right, she naturally turns to the rear in using her right arm and hand to steady herself while alighting from the vehicle.

CHAIN-BOUND SACK TO SAVE THE LIVES OF DIVERS



Placing Diver in the Chain Sack and Administering the Compressed Air and Oxygen After Bag Has Been Sealed

Rapid changes in pressure are likely to have ill effects on divers. For instance, a too sudden ascent from a great depth and the consequent decrease in pressure often result in faintness, giddiness, neuralgia and more serious symptoms. To prevent these afflictions, a special dress, or sack, has been devised in which the diver is placed after he comes up. The top is screwed on tightly and compressed air is introduced to revive the occupant by restoring the pressure to a point near that at the depth to which he was submerged. The pressure is then decreased slowly so that the diver may be accustomed to the gradual change. In addition to the compressed air, oxygen is released into the dress in carefully regulated quantities. The subject is released when normal air conditions are reached.

DOUBLE SPEED OF AIR MAPPING WITH NEW LENS

Aerial photographs for mapping purposes can be taken in half the time formerly required with a new lens developed by the bureau of standards. This is but one of the contributions the bureau has made to American progress during the last year. The organization's activities involved the making of nearly 180,000 tests with a fee value of $675,046; contact was maintained with industry through eighty advisory committees, and a large number of research associates were sent to the bureau representing thirty-six industries. Development of a process which has increased the life of paper currency and a device to hold radio stations on their assigned wavelengths are among the outstanding accomplishments of the bureau. Savings in the production of commonly used articles were reported as a result of practices recommended by the government experts. A committee has a standard building code under work.

VACUUM PHOTO-PLATE CLEANER SAVES TIME AND WORK

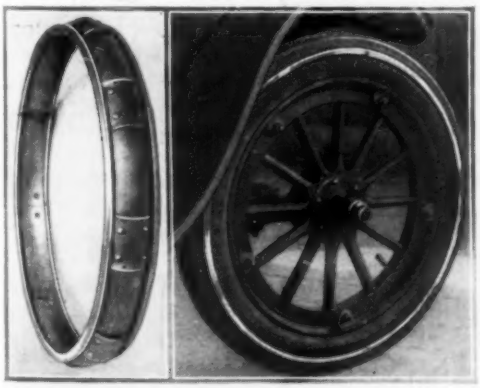
Operating on the vacuum principle, a cleaner for camera plates, devised at the bureau of agricultural economics, simplifies the work and insures better results.

GOLF COURSE ON OIL FIELDS HAS UNIQUE HAZARDS

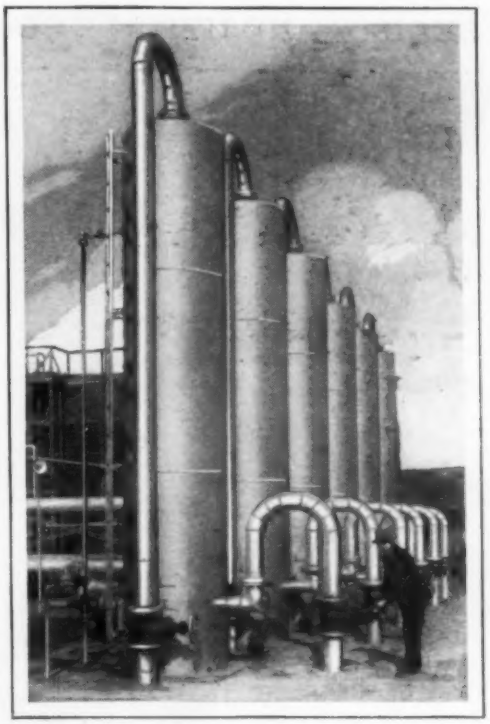
Golf has been placed within the reach of several hundred employes of a California oil company by the conversion of tank farms and fields into courses. The idea originated when the construction program on a large tank-farm site was abandoned after eight of the reservoirs had been erected. The tank bases were flat and smooth, making satisfactory greens, and the earthen dikes, intended for fire walls, proved excellent bunkers. Holes and derricks on one of the fields form effective hazards and, on one of the courses, the presence of a number of rattlesnakes lends additional interest to the game. It is said to be common for a player to kill one or two snakes while making one round. The courses are kept in condition by company employes and incidental expenses are defrayed by small monthly assessments on the persons who are using the grounds.

STEEL ARMOR FOR AUTO TIRES REDUCES PUNCTURE ILLS

Advantages of both a solid and a pneumatic tire are said to be derived from a sectional steel armor, which is covered with a strip of hard rubber and placed over the regular tire. The outer coating is vulcanized to the armor. Besides resisting punctures, this arrangement is said to make the car run more easily, and there are no more jolts than with the ordinary tire. A postman's auto, fitted with the armor, ran 50,000 miles without a flat tire.



Tire Armor at the Left and Assembled at Right, Showing Outer Strip of Hard Rubber

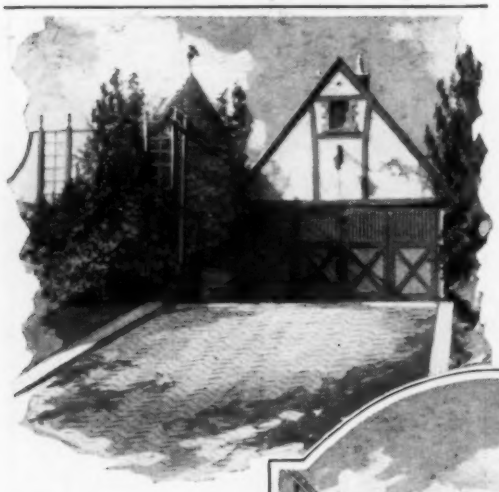


Big Plant Where Gasoline Is Absorbed from Domestic Gas; General View of Extracting Units

FUEL FOR AIRPLANES SALVAGED FROM GAS MAINS

By means of a new process, high-test gasoline, especially suited for airplane fuel, is being salvaged in large quantities from ordinary natural gas intended for domestic purposes. As the gas passes through the incoming mains, it is diverted into huge absorbers, which extract the gasoline and send the "dried" gas on its way to the consumer in even better condition for use, since it will not blacken the kitchen utensils. The process is considered especially interesting because conventional tests showed that the gas had a negligible gasoline content. Two plants are now being operated in California and one in Wyoming, and the product is being marketed to a number of airports or mixed with lower grades to make fuel for automobiles. The equipment for the largest plant occupies nearly three acres and has a capacity of 15,000 gallons of gasoline a day. The apparatus is so nearly automatic that only two men are required for each eight-hour shift. About 50,000,000 cubic feet of gas passes daily.

BEAUTY AND UTILITY COMBINED IN SMALL GARAGES

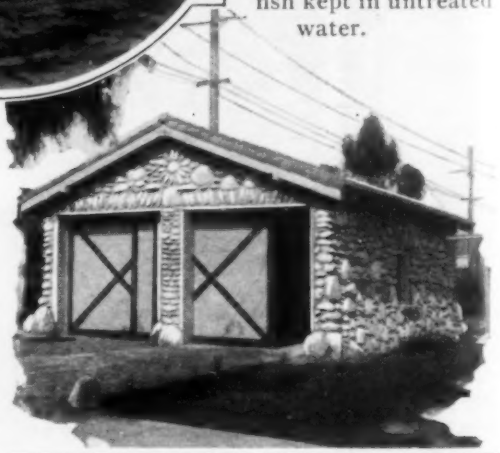


Efforts to get originality and beauty into a family garage have led to many unusual buildings, far removed from the usual shed type. The one pictured at the top of the page is of French-Norman architecture and particularly adapted for a home with large grounds, for the corner tower provides adequate storage space for the garden tools, hose and similar equipment. The building is of inexpensive construction, the wooden frame being covered with cream-colored stucco, set off by rough wood finished in a dark-brown stain, while the upper lights of the doors are crossed by olive-green spindles. An unusual weather vane topping the tower, showing the cow jumping over the moon, adds a novel touch.

For a home of rustic type or in a rustic environment, the second garage, giving the appearance of a reconstructed antique, is quite suitable. The roof not only is concave in the sides, but the peak is as sway-backed as a hard-worked horse. The sides are finished in dark-brown stucco, with gray-stained beams adding the time-worn touch, while the roof shingles are stained in brown, red, blue and tan, intermingled at random.

A third type, employing a pattern laid up in stone, is built of rough cobblestones of various sizes, while the woodwork is painted white, with dark-green trim, the latter being offset by the bright red of the tile roof.

Garage architecture has progressed a long way from the days of the woodshed type, and in many modern designs, the same care and attention have been applied as in planning the house itself.

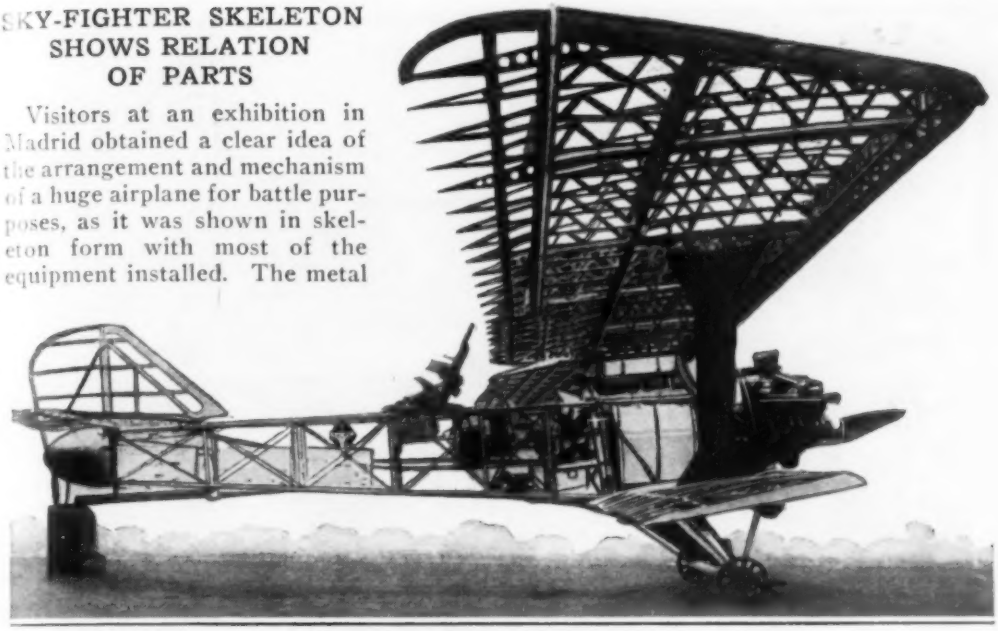


FISH THRIVE ON IODINE

Fish in pools treated with iodine showed more rapid growth than others, according to reports of tests at the Kansas hatcheries. Several experiments were conducted with the chemical as a stimulant to development, while comparisons were made with fish kept in untreated water.

SKY-FIGHTER SKELETON SHOWS RELATION OF PARTS

Visitors at an exhibition in Madrid obtained a clear idea of the arrangement and mechanism of a huge airplane for battle purposes, as it was shown in skeleton form with most of the equipment installed. The metal ribs and braces, wing structure, position of guns, fuel tanks, pit and other features were plainly observable.



Courtesy The Sphere

Skeleton of Huge Fighting Plane Shows Rigid Bracing of Wings, Position of Fuel Tanks, Cockpit and Other Features; Exhibited at Madrid Exposition

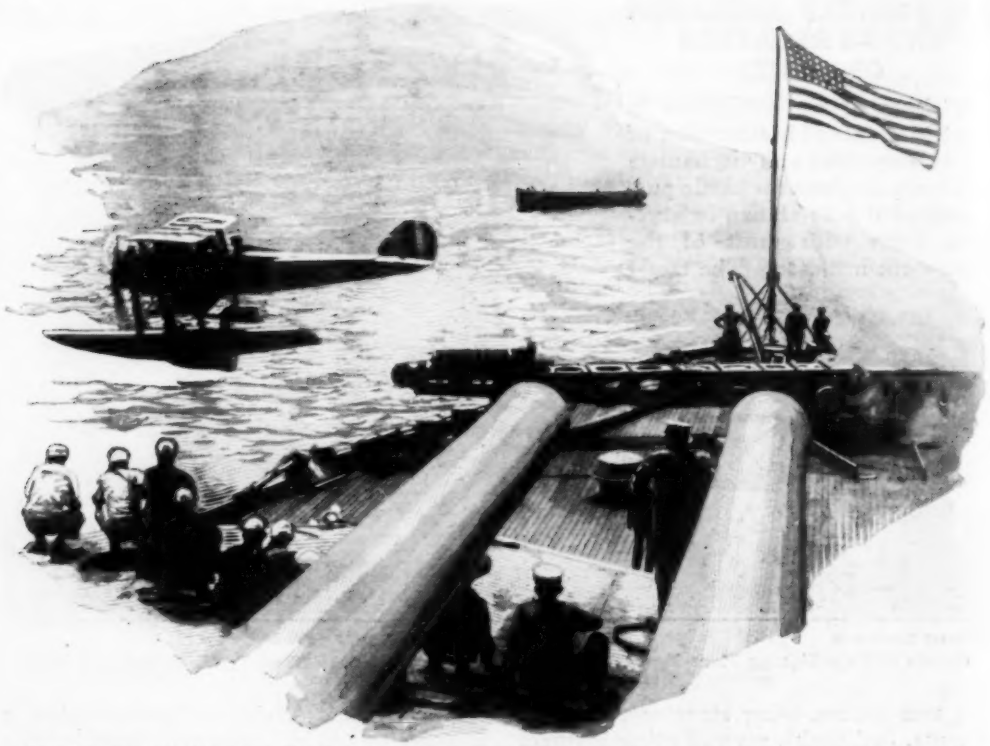
SIGN LANGUAGE AT SAWMILLS SUBSTITUTE FOR TALKING

To make themselves heard above the noise of the saws, workers at the mills have developed a curious sign language. Rubbing the stomach signifies approval, "go ahead" or O. K. If the boss is about, stroking the chin or combing an imaginary mustache gives warning. "Stop" is indicated by holding up one hand, palm forward; "sleepy," head to one side with hand against ear; "help wanted," right hand on muscle of left arm which is bent to indicate strength; "it's raining" or "going to rain," hands spread out, palms down, while the fingers are worked to indicate falling drops; "talking too much," moving the hands to signify a wagging jaw; "disgust," holding the nose and waving the other hand at the offending object as if to say, "go away." The language changes very little except as modifications of machinery necessitate new "words," and the system is used with few variations in most large sawmills.

HULLER FOR PEAS AND BEANS SAVES HOUSEWIFE TIME

Preparing peas or beans for cooking can be done in less time and without staining or injuring the fingers with the aid of a simple huller that quickly removes the contents from the pods. It is clamped to the kitchen table and turned with a crank. Rollers press the peas or beans into a dish, while the pods fall aside. A wider huller is furnished for lima beans and may be run by hand or by motor.

Extracting Peas from Pods with Sheller That Saves the Fingers



Shot into the Air; the Plane Has Just Left the Traveling Carriage, Which Is Visible at the Left End of the Catapult; to the Right, the Smoke from the Powder Charge Is Seen

How It Feels to Be Shot from a Gun

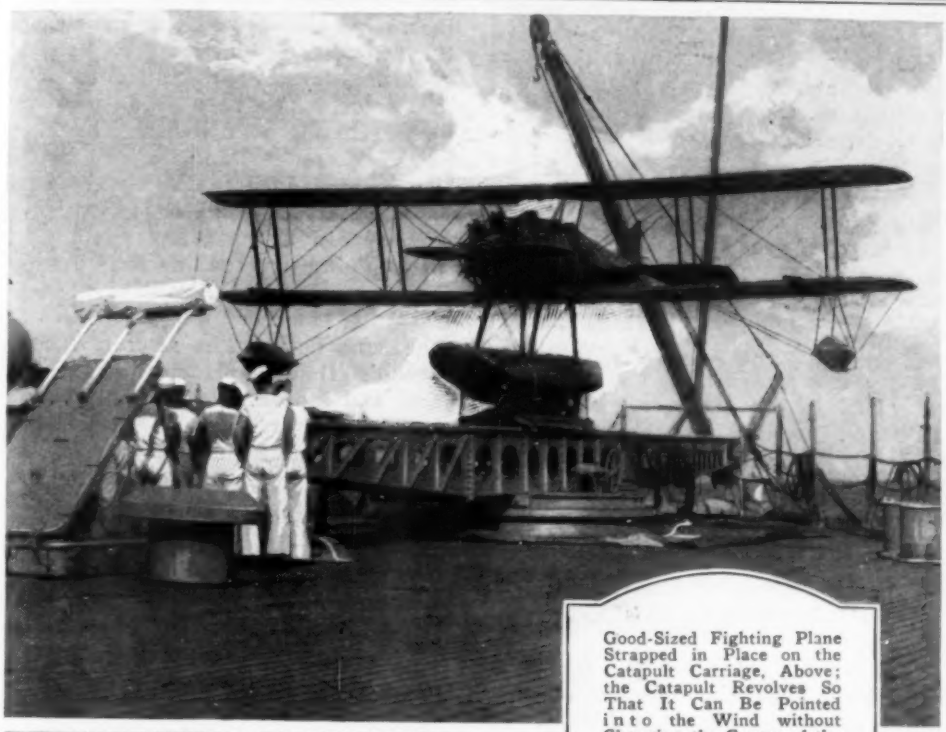
Aviators Fired into the Air by Gunpowder Catapults Saved from Broken Backs or Necks by Padded Rests

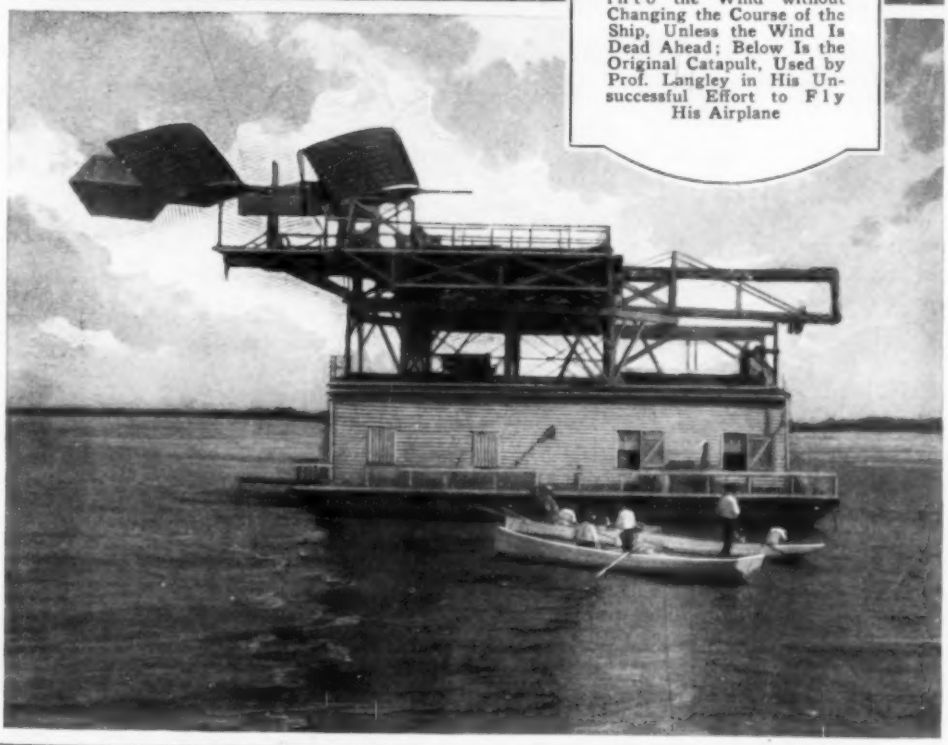
A TERRIFIC blow to the solar plexus. The stomach wall driven in by a crushing blow from the air. Head held tight against a padded back rest that keeps the neck from snapping off. A tingling sensation through the muscles of the stomach and abdominal walls.

That's how it feels to be shot out of a gun while sitting in the pilot's seat of a fast little scout plane. The gun is the new gunpowder catapult of Uncle Sam's battleships. From a standing start to sixty miles an hour in fifty feet and in a fraction of a second is the record, and such an acceleration would break a man's neck and back if both were not carefully protected.

These catapults have replaced earlier equipment operated by compressed air. Their advantage lies in the sureness of operation and the much higher speed attained by the craft in a shorter distance. If you have ever been jerked off your feet by the sudden starting of a street car —a starting that probably doesn't exceed more than ten miles an hour in fifty feet —you can get some idea of how it would feel to reach a speed of a mile a minute in the same distance.

The little single-seater scout and combat planes, which are the main aerial armament of battleships, have been specially designed to meet the terrific strain on the pilot's body during the fraction of a second he is taking to the air. The whole back of the seat is a deeply padded, form-fitting cushion, extending up into a head-rest, also deeply padded, that just fits the head and neck. When the pilot takes his place, he carefully squirms around until he establishes perfect contact from seat





Good-Sized Fighting Plane Strapped in Place on the Catapult Carriage, Above; the Catapult Revolves So That It Can Be Pointed into the Wind without Changing the Course of the Ship, Unless the Wind Is Dead Ahead; Below Is the Original Catapult, Used by Prof. Langley in His Unsuccessful Effort to Fly His Airplane

cushion to top of head, then gives the signal to shoot.

The plane itself is mounted on a carriage on the catapult runway. The powder charge is touched off by electricity, and forces out the piston which operates the launching gear. Like a shell from a big gun, the airplane, with engine turning at flying speed, flashes across the deck on its carriage, whips loose through its own momentum and darts over the side, sinking in a slow glide momentarily until the propeller gets a good "bite" in the air and pulls the ship upward. The operation is over in a few seconds, but until the pilot has done it many times and learned to control his stomach muscles, he rides away with a tingling sensation that lasts for some minutes.

The craft catapulted from battleships are sea planes, with landing pontoons so that, when they return, they can drop into the water alongside and then be hoisted aboard. Successful launching experiments have also been made with flying boats, having boat hulls. The aircraft carrier "Langley," and the two new carriers being added to the navy, also will have planes with regular landing wheels, so they can fly back and alight on the broad, unobstructed decks. Arresting gear developed by the navy bring them to a stop within a few feet after the wheels touch the deck. The aircraft carrier is turned so that the plane can head into the wind and drop on the deck at the stern, straddling arresting-gear cables, which carry hooks that pick up the drag load, first a small amount and then gradually increasing weight until the plane stops.

MILLION-DOLLAR PIER HOLDS HUNDREDS OF AUTOS

Wide parking space for cars is one of the features of the recreation pier recently constructed at St. Petersburg, Fla. Autos can be lined along nearly the whole length of the way from the mainland, and there is additional room for them at the end of the pier, where a pavilion and other conveniences for visitors are provided. The improvement cost about $1,000,000.

Where You Can Take Your Auto with You to the Beach; the Million-Dollar Recreation Pier at St. Petersburg, Fla., Showing the Pavilion and Roomy Parking Spaces

FOLDING TOWER AIDS FIREMEN AND OIL-WELL DRILLERS

Modeled upon the principle of the collapsible periscope, a folding tower, developed by a California inventor, is said to have possibilities of wider application and improved service over similar units because of its compactness when folded and the rapidity with which it can be extended. For an oil derrick, for instance, the inventor asserts that it can be constructed to be raised 150 feet high and yet will be not more than twenty-five feet when collapsed. For a fire-fighting tower, it could be made to rise to 500 feet, going up at the rate of 100 feet a minute and having a carrying capacity of 2,600 pounds.

NOVEL COMPASS TELLS TIME ON ANY SUNNY DAY

A timepiece that requires no winding, but tells time through a combination of compass bearings and the angle of the sun, is a recent invention. It is compact, so that it can be folded and carried in the pocket like a watch. It comprises a small compass and a revolving plate, with two vertical arms, the plate being held at various angles by a notched bracket, to compensate for differences in latitude. A table of corrections furnished with it gives the compass variation at points throughout the country, so that the instrument can be turned until the needle points to the true north. The table is revolved, after being set at the proper angle for the latitude, until a sun beam falls on a hair line. A pointer then shows the correct time. The instrument can also be used to take accurate bearings on distant points, a feature that makes it useful for hunters and fishermen, campers, boy scouts, woodmen and many others.

These Roses, Molded of Butter, Are Accurately Colored and Difficult to Tell from Real Ones

FLOWERS MODELED OF BUTTER IN REFRIGERATOR STUDIO

Working in a heavy fur coat, cap and tall Russian boots, a San Francisco woman models realistic blossoms in butter for display purposes. Her studio is a refrigerator and her gardens flourish on ice. Vegetable dyes are used to reproduce the colors. Careful study of the nature of the substance has enabled the sculptor to achieve successful results even with very small flower designs.

TRIBUTE PAID "BUFFALO BILL" IN LOG MUSEUM

In honor of the late William F. Cody, "Buffalo Bill," a log museum patterned after the famous "T E" ranch house of the great scout is being constructed in Cody, Wyo. It will be made fireproof to protect the valuable souvenirs and exhibits which will be housed there, to reflect, as far as possible, the wild west of "Buffalo Bill's" time. It is expected that the museum will be opened and dedicated in June, when the official opening of Yellowstone park occurs in Cody.

ODD UMBRELLAS SEEN IN NEAR AND FAR LANDS

Umbrellas in the Far East Are Designed for Shade Rather than for Keeping Off Rain

© Keystone View Co.

Big Ones and Little Ones, the Umbrellas of Civilization Are Made to Fit Every Occasion

Big Headdresses Require Much Protection, Even Though the Umbrella Is Almost as Big as the User

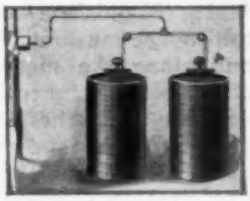
Japanese Umbrellas Are Bowl-Like Hats, While the Breakfast-Food Effect Is Worn to Shed Rain

TANKS ARE SUNK INTO POSITION TO SAVE DIGGING

When a New Zealand contractor encountered extremely soft soil while making excavations for large concrete sewage tanks, he suspended digging operations, built the tanks at ground level and then sunk them to the required depth by allowing them to settle of their own weight plus that of railroad rails piled on top of them. It was only necessary to remove part of the ground within the diameter of the tanks which were thirty feet across and twenty-two feet high. During the work, an interesting find was made in the form of trees imbedded in clay, apparently remains of a submerged forest.

NATURAL GAS SUPPLIED HOMES IN STEEL BOTTLES

For households in localities where city gas is not available, supplies of the natural product for cooking and heating are furnished in steel containers which are refilled when emptied. The gas is in liquid form in the drum, but returns to its original state, when released at the burner, with an admixture of thirty-nine parts of air. It is said to give a hot, blue flame that forms no carbon or soot, and the cost compares favorably with that of manufactured gas, about one and one-half cents per burner hour. In home installations, two drums are furnished, one being kept in reserve for use when the other is taken to the service station for refilling. Outfits of portable type are obtainable forcamping.



PAPER RAINCOATS

Raincoats of waterproof paper are among the most recent articles to be made of this material. A thriving Wisconsin firm is turning out 15,000 of the garments yearly. Other products include kitchen aprons, vests for hunting and fishing, school-book bags, slippers for bathing beaches, radiator covers, children's caps and golf caps. A crepe variety, specially treated, has proved effective.

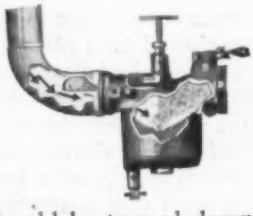
Vincent Lopez and Jeanne Gordon Demonstrating the Possibilities of New Horn

HORN IMITATES HUMAN VOICE WITH CONTRALTO NOTES

One of the latest orchestral novelties is a huge horn that is said to produce tones similar to those of the human voice. This is most noticeable on contralto registers, according to reports, a demonstration being given while an opera star sang as the horn was blown.

FUEL MIXER FOR SMALL CARS SAVES GASOLINE

Gravity plays an important part in the operation of an automatic fuel regulator for small automobiles. It is adjusted to provide a richer mixture when going up hill and a lean mixture on down grades, so that waste of fuel is avoided and the right strength is furnished when needed. It is easily installed, taking the place of the hot-air stove on the motor. The needle valve in the carburetor should be turned down about one-quarter turn and the spark lever advanced four or six notches after the mixer has been put in.



Fur Coat

Typical Pirogue Trail through the Louisiana Marshes; along Such Narrow Waterways the Boat Trappers Place Their Traps for the Millions of Muskrats That Inhabit the Swamps

By BOB BECKER

MUSKRAT pelts that a few years ago were considered worthless to the trade but are now the backbone of America's fur industry; and the largest muskrat ranch in the United States where some years ago a few French-speaking trappers operated —these are the most recent developments in the Louisiana muskrat business, which today produces approximately 50 per cent of all the rat pelts used by the manufacturers of furs. That these unusual and dramatic changes in America's fur industry should take place in a subtropical part of the United States which, according to popular belief, is a poor producer of good fur, is another interesting angle of the Gulf coast development, as heretofore Canada and Alaska have been considered the heart of America's fur production, and one would naturally look to the north country for the latest and most scientific innovations in growing and handling fur. And as if Louisiana were not doing enough to produce muskrat skins on a large scale and along the most scientific lines, it offers to the fur men a novel labor-saving device in the clothes wringer. Down there in the great coastal marshes where more than 6,000,000 rat skins were taken in a single season (1924-5), the French-speaking Cajan trappers use an ordinary clothes wringer to flesh the pelts, an operation that no section of the country had ever thought of before the coastal trappers showed the way.

Mile after mile of coastal marshes with lagoons, lakes, ponds and luxuriant aquatic growths; millions of ducks, geese and other water birds; soft-voiced, easy-going Frenchmen, some of whom trace their origin to the Acadians whose tragic story has been immortalized in Longfellow's "Evangeline"; muskrats so abundant that their moundlike homes of cut grass look

Ranching in Swampland

Cajan Trapper and His Catch; the Cajans of Swampland Are the Descendants of Longfellow's Evangeline and Other Acadian Exiles

like haycocks in a meadow—this is Louisiana's rat country, an area so foreign in atmosphere because of the use of French that the visitor has the impression that he has entered a part of France instead of being on American soil. In this land of Cajans, ducks and French drip coffee, have evolved the most modern methods of rat ranching, all in line with strict conservation.

You travel way to the western border of Louisiana to see what has been called the biggest rat ranch on the continent. Orange, Texas., just across the Louisiana line, was my destination when I started out for this ranch which is owned by the Starke land company. There C. O. Leedy, the manager, provided a speedy launch for our party and then down a winding river we sped to the heart of the rat country. From the river you enter upon a system of man-made canals dug by the company so that their territory (approximately thirty-five by fifteen miles in extent) is accessible to trappers.

After seeing the broad sweep of the Louisiana marsh which extends along the Gulf coast you can readily understand why Louisiana produces more pelt bearers than any state in the Union, and even exceeds the total fur take of all the provinces of the Dominion of Canada together. As far as you can see there is nothing but water and then more water; aquatic grasses and other types of swamp vegetation; ponds, bayous, little lakes, mud, ducks, muskrat houses, and an occasional "chenier" or ridge. That ridge business fools the visitor at first. In most any part of the United States a ridge is a decided elevation. Down there in the flat, monotonous "aquatic prairie," a ridge is just a little rise that dominates a part of the marsh from the magnificent elevation of two or three or four feet! Here a few cattle are placed

to feed upon the rich grasses, but sometimes it is a race between the stock and the wild geese for the grass as countless thousands of these big game birds consider the cheniers their cafeterias.

In this fascinating lowland country the Starke company has developed the most serviceable pelt-drying method that has ever been seen in the land of muskrats. Applying up-to-date business practices to the fur business—which is probably the oldest industry in the world, as even in the Stone Age early man killed the beasts of the field for their pelts—the company constructed a drying house which means easier handling of skins, and more perfect pelts when the buyer comes around.

They built a long shed with a good roof so that no rain could penetrate. Then a giant rack, capable of holding 70,000 pelts on wire stretchers, was constructed in such a way that it could be rolled out of the shed onto a platform on sunny days or pushed into rainproof quarters when inclement weather makes it impossible to dry skins outdoors. This ingenious rat-drying "train" is today the most outstanding progressive step toward production and efficiency in Louisiana's giant muskrat business. In the past, the trappers always hung their skins on racks outside their tents or cabins. They were usually at the mercy of the weather. The result was many a spoiled pelt. Louisiana's newest large-scale rat ranch has abolished this wasteful primitive method by the invention of this exceedingly practical drying rack.

To follow a trap line is like a trip through an overpopulated bird land. In the north, running a line in a marsh means walking from one set to another. Down in the Louisiana marsh, the trappers find it either impossible or far too hard work to plow through the water and sticky mud, so they cut a narrow "trena" or channel through the vegetation. Along this highway their

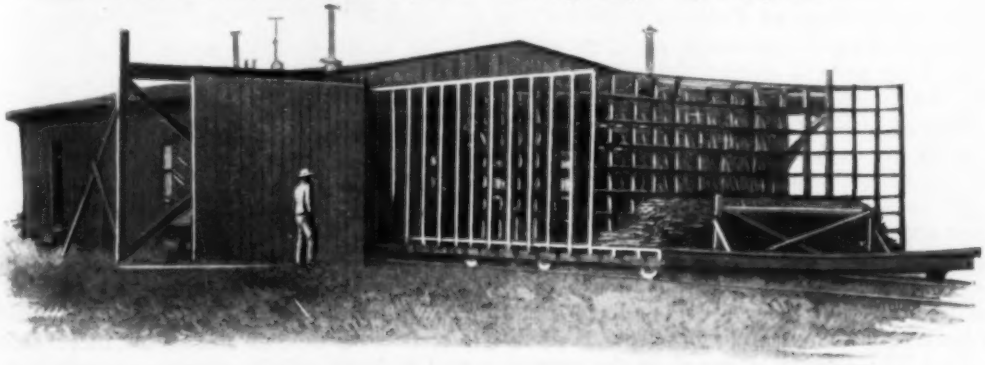
Surplus Fat Is Squeezed Off in a Common Clothes Wringer, Top; Above Is a Typical Trapper's Camp Pitched on Stilts to Keep It from Sinking into the Swamp

Fur Buyers Visit the Trapper's Camps to Inspect and Purchase the Drying Skins

An End View of a Loaded Drying Rack with 70,000 Skins, Hauled Out into the Sun; at the First Hint of Rain the Pelts Can Be Whisked Inside in a Moment

traps are set and the entire string is made accessible by a pirogue or shallow-draft duck boat. Where the water is but a few inches deep on the floor of the marsh, the trapper brings in a horse, hitches it up to the little pirogue and rides on the trena highway which is lined by tall grass and quacking waterfowl.

The most interesting feature, however, is not the value of the pelts taken from the marsh. It is the conservation policy developed to insure that the coastal marshes will always produce a rat crop that runs into the millions. In 1924-25 the pelts harvested from the marshlands were valued at $5,142,896.95. Last season the small Louisiana rats were scarce, owing to a drought. They brought an exceptionally good price. Dame Fashion has decreed silver muskrat a popular skin for ladies' coats. This kind of fur grows on the body of the Louisiana rats; so they were valuable. Facing a short rat crop the Starke company inaugurated a conservation policy on their big ranch, with the mandate that there should be no trapping in order to conserve breeding stock for this season. This brought into action something that the native trappers had not seen before—"muskrat wardens," living in small shacks built on stilts above the marsh. They patrolled the lowlands to see that the no-trapping injunction was strictly obeyed by every one.



Drying Sheds Are Built like Huge Aircraft Hangars, with Racks That Run on Railroad Wheels and Track, and Each Capable of Holding Many Thousand of the Pelts

DRUG SIGN ON MAIL BOX AIDS "SHOP EARLY" CAMPAIGN

Copyright, Herbert Photos

Parcel-Post Box Used for Drug-Store Sign; the Other Side Bears a "Shop Early" Reminder

Converting the sides of a parcel-post receiving box in front of his store into a billboard, a Massachusetts druggist accomplished a double purpose in painting a sign on the box. He advertised his firm and also aided the post office department's drive for early mailing during the holiday season by including in the sign a message urging early buying. Permission to use the box in this way was granted by the local postmaster.

LOST TOMB OF EARLY MARTYRS FOUND AT EPHESUS

Workmen clearing away debris around the excavations at Ephesus recently uncovered what scientists pronounce to be the long-sought catacombs of the early Christian martyrs, known as the "seven sleepers of Ephesus." The story goes that seven young Christian men, about 250 A. D., hid themselves in a cave to escape their pursuers. Their refuge was discovered and the entrance to the cave blocked. Nearly 200 years later, a shepherd discovered the cave, found the inmates and awoke them from the sleep that had seized them shortly after their imprisonment. The emperor Theodosius II heard of the marvel, hastened to the cave and is said to have listened to the martyrs' narrative of how they had been kept alive, as a confirmation of belief in the resurrection of the dead. After they had delivered their message, they again fell asleep, the legend has it. In the ruins of the tombs, many lamps of designs depicting early Christian scenes were found.

DIGGING CANAL WITH DYNAMITE CHEAPER THAN DREDGING

Dynamite scored an effective victory over dredges in constructing a drainage canal beside a road through swampland in Louisiana. In less than half a day, a channel was blasted out while a month would have been required, had dredges been used, engineers report. The charge was set off by electricity, the sticks of dynamite, placed along the canal site, being connected with wires. By the use of a button, an excavation ranging from seven to ten feet deep and between thirty to forty feet wide was instantly made along the highway. Contractors estimated that the work would have cost $1.50 per cubic yard by dredging. With the dynamite method, the cost was twenty cents per cubic yard.

PATIENTS' PORCH ON A PIVOT TURNS WITH SUN

Small living porches at a Dutch tuberculosis sanitarium are built on pivots so that they can be turned toward or away

Turning the Porch to Admit More Sunlight, a Feature of Dutch Sanitarium

from the sun as the patient needs or desires. The unit is closed on three sides and is just large enough to contain a reclining chair or bed, table and bookstand.

AIRPLANE WING ON BOAT INCREASES ITS SPEED

"Miss Spitfire V," with Airplane Wing Attached, Made Fifty-Eight Miles an Hour in a Recent Test; the Boat, without This Aid, Previously Sped at More than Forty-Seven Miles an Hour

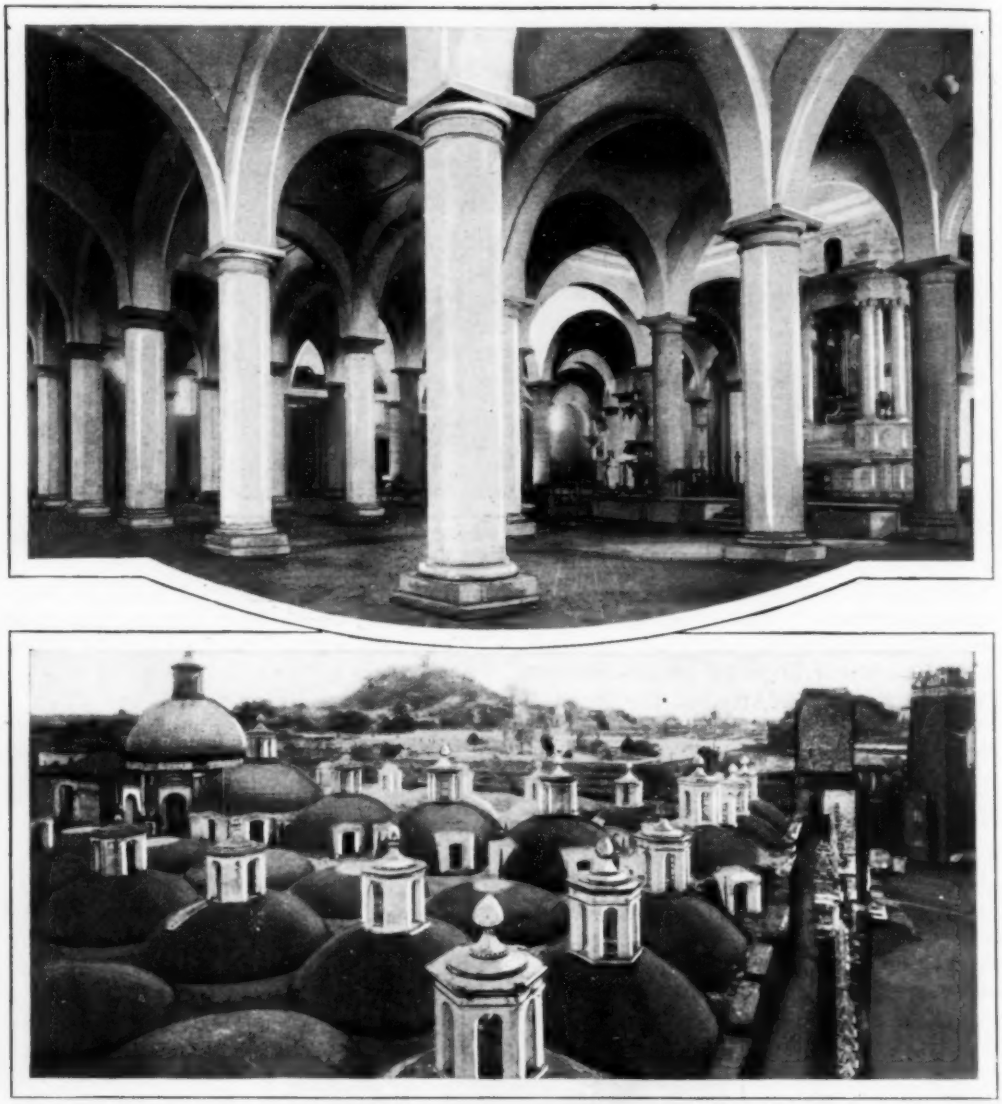
A speed record made by the motorboat "Miss Spitfire V" was increased by over ten miles when an airplane wing was attached to the craft. In a race off San Diego bay, the boat attained the speed of 47.05 miles an hour and later made fifty-eight miles with the wing.

HOUSES ARE BUILT OF BUBBLES MIXED WITH CONCRETE

Building with bubbles suggests an impractical fancy, but a California inventor is doing exactly that, with the aid of concrete, and already has several dwellings and a schoolhouse to show for his plan. The bubbles, imprisoned in a special lather or foam, are mixed with the cement and partly replace the usual aggregate of sand and pebbles. The result is literally a bubble-stone, the porosity and lightness of which may be varied according to the amount of solid material used. Cubic-foot blocks weigh from fifteen pounds to 150 pounds each. In the uncured stage, the mixture is like soft cheese. It may be sliced with a wire or sawed, but when it has set, it is like any other cement product, yet has several distinctive features. Nails can be easily driven into it without causing breaks or fractures. They may then be withdrawn, while the hole is filled with cement mortar, and inserted again, thus becoming firmly imbedded. The material is said to be excellent for insulation purposes, is highly resistant to fire and can be adapted to a wide variety of forms, such as blocks, slabs, tile, boards and shingles. It is successfully employed for floor fill, reinforcing, partitions, decorations, pipe, refrigerator and incinerator insulation. The buildings already made of the bubble mixture are of grooved blocks, bound together with steel rods and cement.

Preparing the Bubble Foam Which Is Mixed with Concrete, to Form New Building Material

FOREST OF DOMES FORMS QUEER ROOF OF CHURCH



The Church of the Seven Naves, at Cholula, Mexico, Has Sixty-Four Columns, Forming the Seven Naves, and Surmounted by Forty-Seven Domes, Giving the Roof an Unusual Appearance

A church roof consisting largely of forty-seven small domes, an unusually odd architectural arrangement, is one of the features of Cholula, Mexico. The church which was one of those taken over by the Mexican government last summer, when it ordered enforcement of the law against foreign priests, is called the "Church of the Seven Naves," because, instead of the wide clear spaces typical of Gothic architecture, the interior is split up into a series of naves by sixty-four large columns, which in turn support the many small domes of the roof.

SHIPS BUILT IN DRYDOCKS ARE EASIER TO LAUNCH

The old way of building ships on shore and then sliding them into the water may be abolished as a result of naval experiments with a shipbuilding drydock on

Puget sound. The launching ways which have been used for generations have grown more and more unsatisfactory as the size of ships increases. They require elaborate framework to support the vessel while it is sliding to the water, and, even then it is hard to avoid undue strains on some parts, while, after the ship has left the ways the problem of stopping it, particularly if the shipyard is on a narrow river, is serious. When the aircraft carrier "Lexington" was launched at Fore river, it attained a speed of nineteen feet a second as it left the ways. To bring the ship to a stop an elaborate system of chain drags was used, requiring a considerable expenditure of time and money. The navy shipbuilding drydock, on the other hand, cost less than a well-equipped building way, and when a ship is completed, it is only necessary to fill the dock with water, open the gates and tow the hull out. A dock for shipbuilding is smaller and cheaper than an ordinary drydock, which must be deep enough to allow the biggest ship to pass over its sills, a requirement that necessitates forty feet of water over the sills now. The navy dock needs but nineteen feet of water to accommodate the biggest ships, for the hull as launched, without superstructure, engines, guns and interior fittings, is much lighter than a completed ship, and hence floats much higher. While the new dock was under construction, two 10,600-tonships, the "Nitro" and "Pyro," were laid down and completed in it and were ready to be launched about the time the dock was completed.

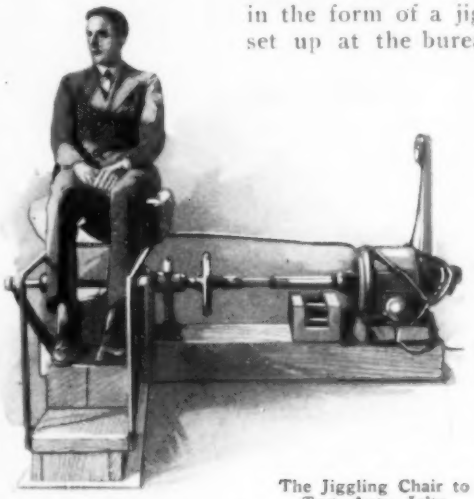
Huge Kite Made for the Japanese Crown Prince; It Resembles Both a Dragon and a Bird

BIG KITE FOR JAPANESE PRINCE MODELED AFTER DRAGON

Kite flying is both a sport and a ceremony in Japan, and expert craftsmen are trained to construct elaborate pieces for use on holidays and other occasions. Not long ago, a huge dragon kite was made especially for the crown prince. It has wide, curving wings on each side of a dragonlike center.

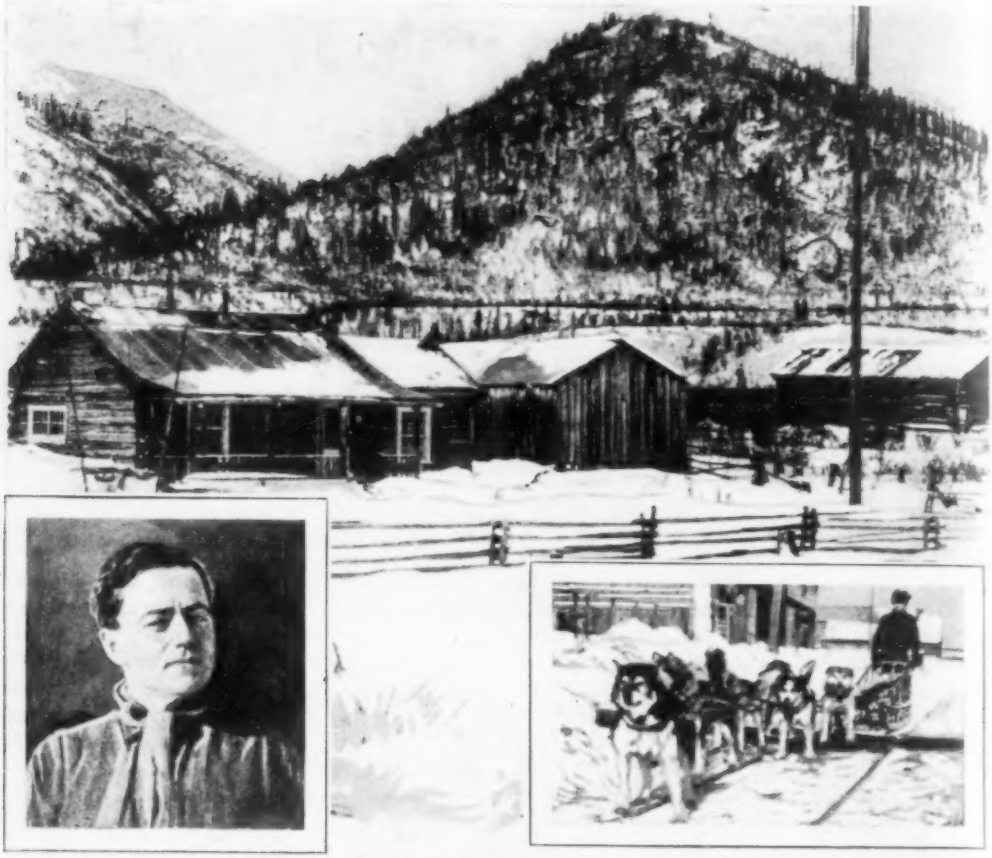
STUDY AUTO'S JOLTS AND JARS WITH JIGGLING CHAIR

To learn more about the secrets of the auto's movements, a "bucking broncho" in the form of a jiggling chair has been set up at the bureau of standards. Its movements can be amplified to varying degrees and the vibrations increased from 100 to 1,000 per minute. Tests made with human subjects show that some vibrations as small as one to two one-thousandths of an inch, are very disagreeable to certain autoists, while others do not notice motions which are much stronger.



The Jiggling Chair to Test Auto Jolts

RADIO LINKS ARCTIC OUTPOST TO CIVILIZATION



Private Ulen, His Home in Wiseman, Alaska, and His Dog Team; as United States Commissioner, Postmaster, Head of School Board and Radio Operator, He Is Town's Leading Citizen

Although he is but a private in the United States army, Elmer J. Ulen is recognized as the most important resident in Wiseman, Alaska, on the Arctic circle, for he is operator of the army's farthest-north radio station. Through him, the little town receives the latest news from the outside world and can make known its needs. Besides running the station for the signal corps, Ulen is United States commissioner, postmaster and head of the school board.

ROUGH STRIP IN ROAD CENTER AIDS AUTO SAFETY

In place of the white-painted line down the center of automobile roads a raised strip of rough pavement has been proposed to the highway research board. It would be sufficiently low to permit driving over it in case of necessity, but would discourage drivers from taking the wrong side of the road, especially on curves, supporters of the plan declare.

TOY BLOCKS OF SOFT RUBBER PREVENT ACCIDENTS

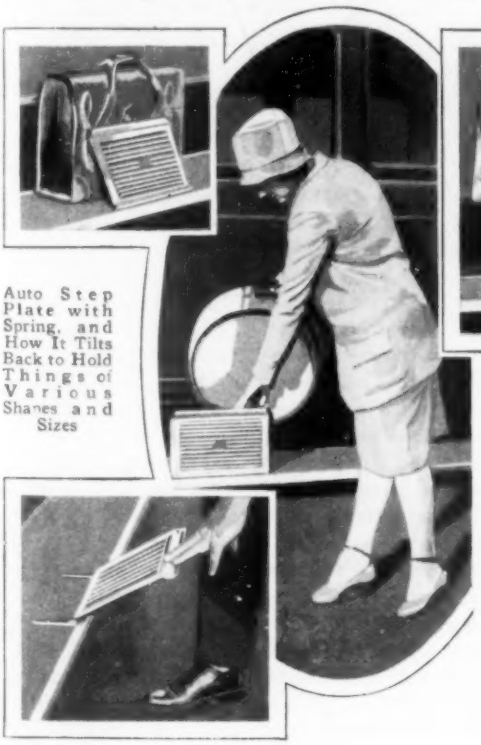
Children like to throw their blocks about with consequent risk of personal injury and damage to the furniture. These hazards are eliminated in a new form of block, made of soft, sponge rubber, stamped with figures and letters, and which can be washed when soiled.

SWIVEL GRIP TO FASTEN SPRING PREVENTS BREAKAGE

Springs are securely fastened to doors, chests and other articles by means of a quickly adjusted grip, in combination with a swivel hook that permits turning to prolong the life of the spring and give better results. The base of the fastener is fitted with a number of curved arms, which are inserted between the coils at the end of the springs. They serve to equalize the pull, preventing undue strain on any one part, and hold securely, yet can be removed easily without damaging the coils.

STEP PLATE TILTS TO SERVE AS LUGGAGE CARRIER

Equipped with a strong spring concealed in the hinge, a step plate for the auto running board can be tilted back and luggage held between it and the side of the car. The spring maintains a tight grip on the piece, so that it is not likely to fall out, and no ropes or straps are needed. The plate is easily attached to any running board and has rubber lining to prevent marring the articles and to help hold them.



Auto Step Plate with Spring, and How It Tilts Back to Hold Things of Various Shapes and Sizes

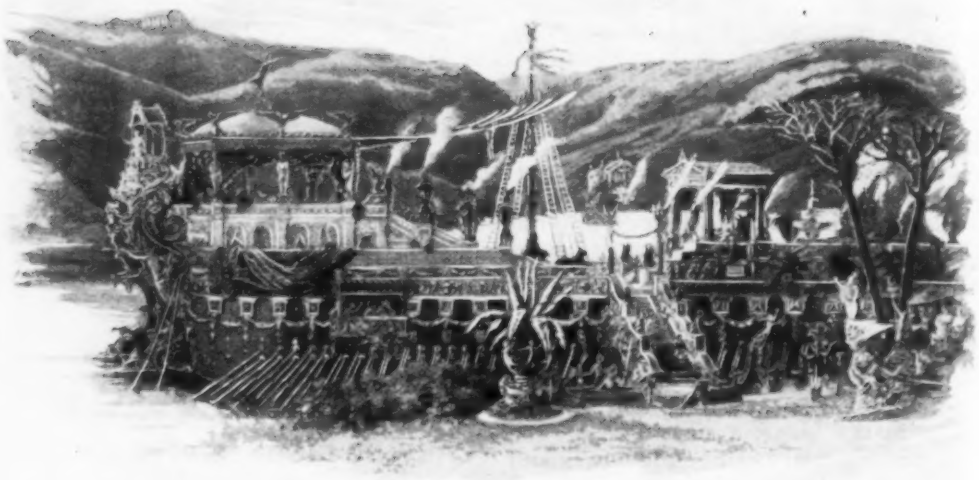
Albert Goff, Carving Figures and Designs from Clay Bank with Trowel, the Only Tool He Uses

CARVING FIGURES IN CLAY BANK ARTIST'S OUTDOOR HOBBY

With a trowel as his only implement and a clay bank as his studio, a mid-western artist has attracted considerable attention by the carvings he makes as an outdoor diversion. He has not studied sculpture and makes no pretense at finished work, but his human and animal figures are rendered with great accuracy. Much skill is required in planning and cutting a group so that the bank will not cave in.

RULES OF THE SKY

Traffic rules for aviators have been compiled by the English air ministry, governing the question as to what type of craft has the right of way and applying to less important details. For instance, flyers are required to carry safety matches, are not allowed to take dogs along, cannot drop leaflets from their planes and must not maneuver in a way likely to cause annoyance to persons on the ground. This would automatically prohibit flying close over cities or above great crowds of people gathered at shows or athletic contests. The traffic rule of the sky there, is that aeroplanes must give way to airships and balloons, while a balloon is given the right of way over an airship.



Reconstruction of Caligula's Larger Galley as It Probably Appeared When Moored at the Shore of Lake Nemi, Where the Mad Emperor Used It as a Country Palace

Emperor's Treasure Ships to Be Raised

Italians Plan to Drain Lake to Recover Art Objects Hidden by Sinking of Caligula's Royal Barges

ORDERS for the draining of Lake Nemi, fifteen miles from Rome, have been given by Premier Mussolini, to enable the Italian museums to recover the vast store of priceless art treasures carried down 1,900 years ago, when the royal barges of Emperor Caligula sunk to the bottom. There were two of the vessels, one 198 feet long and sixty-six feet broad, which now lies fairly near the shore, and a larger ship, 231 feet in length and seventy-eight feet in breadth, lying some distance farther out in ninety feet of water.

The smaller vessel, divers have found, is in a fairly good state of preservation and has intact practically all of its priceless ornaments, including metals, ceramics, terra cottas and mosaics, as well as all the interior machinery and equipment of the emperor's household. The larger ship, the location of which was found as long ago as the fifteenth century, has been almost denuded of deck fittings of bronze, gold and other metals by searchers who have explored the bottom with grappling hooks and torn away everything the grapples would fasten on.

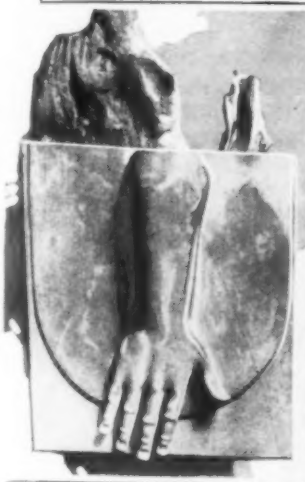
Draining of the lake may result in the complete restoration of the smaller ship and its refloating as a permanent museum of Roman life just as a Cæsar lived it. The engineering task is not especially difficult, inasmuch as the lake is somewhat higher than Lake Albano. A tunnel will be driven from Nemi to the lower lake and the water drained off, while a dock will be built and cofferdams fitted around the smaller ship, so that it may be repaired and raised. The tunnel will then be stopped up permanently and the lake allowed to refill.

The two royal barges, which were used partly in connection with religious ceremonies and partly as pleasure palaces for the emperor, were really just that—floating palaces. They were anchored near the shore in front of a temple of Diana, which is now being unearthed. The two formed a striking marvel of naval construction and an unusual expression of im-

Bronze Lion Head with Mooring Ring, Recovered from Lake

Bronze Statue of Caligula's Sister Found on Galley

Bronze Medusa Head with Snakes, One of Recovered Treasures



An Augural Hand in Bronze, Still Clinging to a Fragment of the Beam Whose End It Once Graced on Caligula's Ship

Left, Head Suggesting the Wolf of Romulus, Which, like Many of the Other Objects, Was Made Useful by Adding a Bronze Ring between Its Teeth; Above, Ruins of the Temple of Diana, Goddess of the Hunt, Which Once Graced the Shore beside the Wharf Where the Emperor's Galleys Were Moored

Courtesy Federico Halbherr

perial luxury, reproducing in their ornaments and fittings, mosaic pavements, terraces, altars, fountains, statues and decorations of bronze and gold all the splendor of the imperial mansions on the Palatine.

Antiquarians believe that the immense weight of bronze, gold, silver and marble that went into their embellishment was largely responsible for their early sinking. No mention of them is found in later Roman historians, but their memory was handed down from antiquity by folk legends, and led the renowned architect of the renaissance, Leon Battista Alberti, to attempt to raise them in the fifteenth century. He succeeded, using grappling hooks, in bringing up some bits of wood and some metal ornaments. In 1885-89 the British ambassador, the late Lord Savile, did considerable fishing in the lake and brought up numerous metal and marble objects, which were placed in an English museum. Italian scientists also have gathered quite a collection of beautifully carved and molded ornaments.

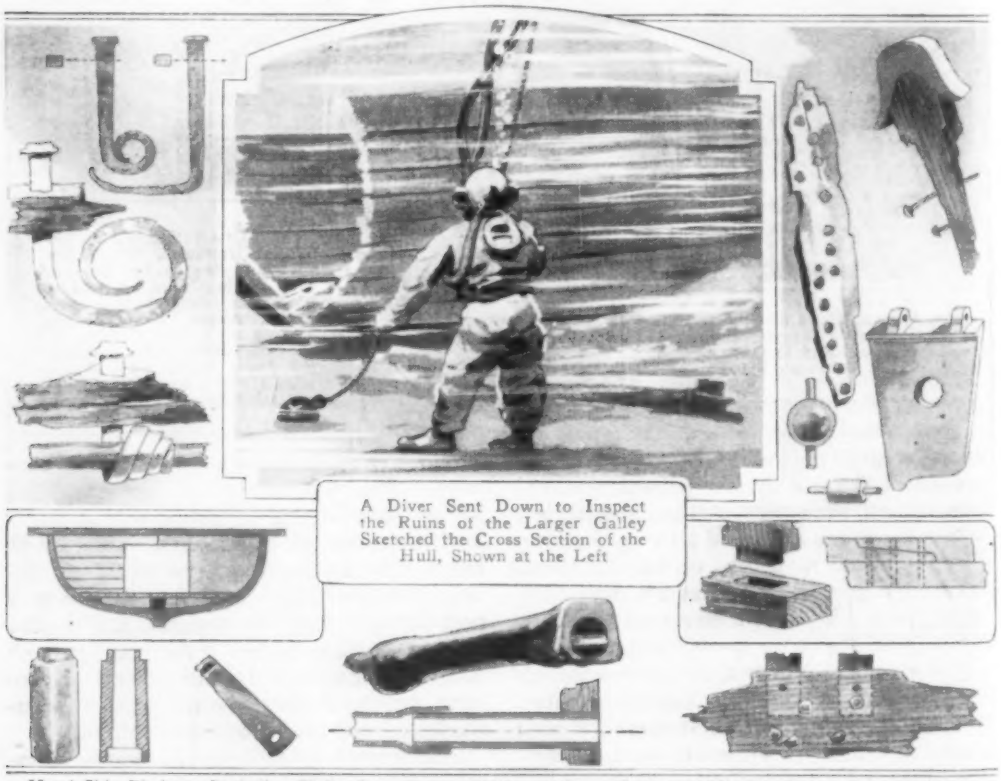
The emperor Caligula, at whose command the galleys were built, outshone all the Cæsars in extravagance. According

to Seutonius, "he surpassed all the prodigals that ever lived in the devices of his profuse expenditures; inventing a new kind of bath, with strange dishes and suppers; washing in precious unguents, both warm and cold; drinking pearls of immense value in vinegar, and serving up for his guests loaves and other victuals modeled in gold."

Caligula became emperor in 37 A.D. His bent for the gorgeous and bizarre probably reached its height in his pleasure galleys. Investigation by divers indicates that the ships really were country estates, with decks surmounted by marble palaces, columned temples, numerous elaborate baths and galleries, and even carefully tended terraces, planted with growing trees and vines, as well as shrubs and flowers. The emperor also owned a pair of wonderful galleys with poops studded with precious stones and sails of many colors, built for tours along the sea coast, but, being subject to seasickness, he preferred the quiet waveless expanse of the inland lake when he went yachting. Dining in the great marble banquet hall of the imperial barge, however, was not always a pleasure to the emperor's guests, for the host had a peculiar sense of humor that found outlet in slaying his supper companions. Seutonius relates that one night at dinner the emperor burst into laughter, and the consuls who reclined on the couches on either side of him asked what was the matter, to which the mad monarch replied that he was amused at the thought of how easily he could have both their throats cut!

When he was killed in 41 A. D. by a tribune of the Prætorian guard there was general rejoicing in Rome.

If Mussolini's project succeeds, though, the reconstruction of the scene of a Cæsar's pastimes may astonish the world by its magnificence. The museum will be unique in that the works of the long dead artists will be displayed in their original surroundings, just as they were when the emperor and his guests used them.

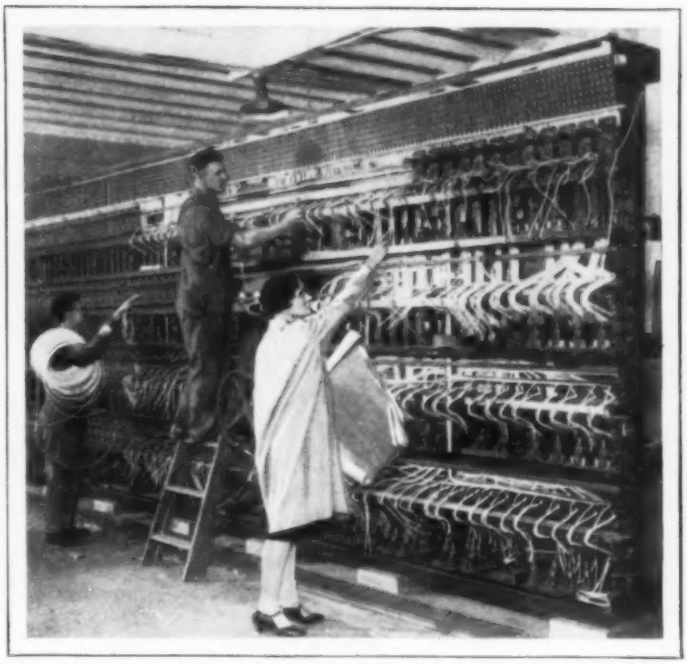


A Diver Sent Down to Inspect the Ruins of the Larger Galley Sketched the Cross Section of the Hull, Shown at the Left

Metal Ship Fittings, Including Nails, Stanchions and Bits of Terra Cotta and Wooden Parts, Recovered from the Lake; Note the Mortise and Tenon Used by the Roman Builders

REFINING PROCESS IS SUITABLE FOR COMPLEX ORES

Complex ores which cannot be economically treated by ordinary processes are reduced to bars of alloyed metals which can be sold to smelters, by a method developed by two western chemists. Their system is a patented combination of operations, said to be specially adapted to small-scale workings. A reduction plant near Spokane, Wash., represents an investment of but $3,500 and employs only five men, but is said to be operating at a profit. After smelting, the metal is available in bars containing lead, zinc, copper, gold, silver, bismuth and antimony, which has been produced at a purity of 99.4 per cent from ores out of mines in northern Idaho. One of the inventors of the process is a high-school chemistry instructor.



Miss Gertrude Stroobaut Directing Assembly of Roxy Theater Switchboard at Chicago Plant Where It Was Made

THIRTY TONS OF SWITCHBOARD FOR NEW THEATER

Lights sufficient to illuminate a city of 15,000 to 20,000 persons are controlled through a single switchboard for the new Roxy theater in New York. It contains between six and eight miles of wire, weighs approximately thirty tons and has 1,200 controls. A feature of the installation is the dimming mechanism. This permits a great saving in space. The board is but twenty-one feet long, whereas, with the usual type of dimming devices, it would have been seventy-five feet long, to afford the same service. An additional point of interest is that a young woman made practically nine-tenths of the drawings for the complicated board and helped supervise its assembly. Only part of the equipment is shown in the photograph.

SPECIAL TRUCK FOR BUILDERS KEEPS STREETS CLEAR

While erecting a building, a western contractor kept the streets free from stored materials by installing a special truck and track system to haul brick, mortar, tile and other supplies from a central distributing point to the workmen. Mortar was mixed away from the building and then taken to the masons in large portions, as needed. Trucks were loaded with brick at the yard and removed from the wheeled platforms at the scaffolds, where they were hoisted in as a unit.

Loaded Brick Carriers Are Hauled to Building Directly from Yards, Saving Piles in Street

Airplane Suitcase Open Showing Removable Compartment and Bars like Those of a Wardrobe Trunk to Hold Garments

SUITCASE AS WARDROBE TRUNK FOR AIRPLANE TRAVEL

Constructed on the lines of a wardrobe trunk, a suitcase has been devised with a view to adaptability to airplane travel. It is especially serviceable, however, for journeys by rail, boat or auto because of its compact size and large capacity. Equipped with hangers, retainer bars, compartment trays and other trappings of a trunk, it is small enough to be slipped under a sleeping-car seat and is light and durable. One size will hold twelve dresses, three pairs of shoes and forty-two other items, while the largest size will contain four men's suits, six shirts and fifty-one other garments.

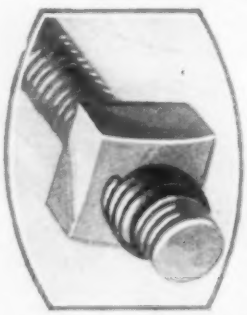
SCRATCH-PROOF AUTO BODIES OF COLORED METAL

Material for automobile bodies that does not show scratches and has a surface resembling glazed porcelain is reported to have been discovered by a German electrical engineer through a process of alloying aluminum with other metals. The result is said to be a "built-in" finish that can be produced in varying colors.

EXPERT SCOFFS AT BORN-FLYER IDEA

Anyone with average intelligence, after a few hours of competent instruction, can learn to operate an airplane alone, according to Sir Alan Cobham, the British aviator. He declares that there is little similarity between military and commercial flying and that to succeed at the latter, a person does not have to be a "born flyer." Six clubs in England are turning out aviators every week, he reports. Army flyers are required to take difficult tests because of the dangerous maneuvers they must perform in battle service, and it has been said that only a born flyer could pass. Such examinations are not necessary in commercial flying, Sir Alan points out and says that the common idea that there is "something wonderful" about flying, is not well founded. The era of private airplane ownership is rapidly approaching, he believes, and it promises to revolutionize our habits as much as the universal ownership of automobiles has done.

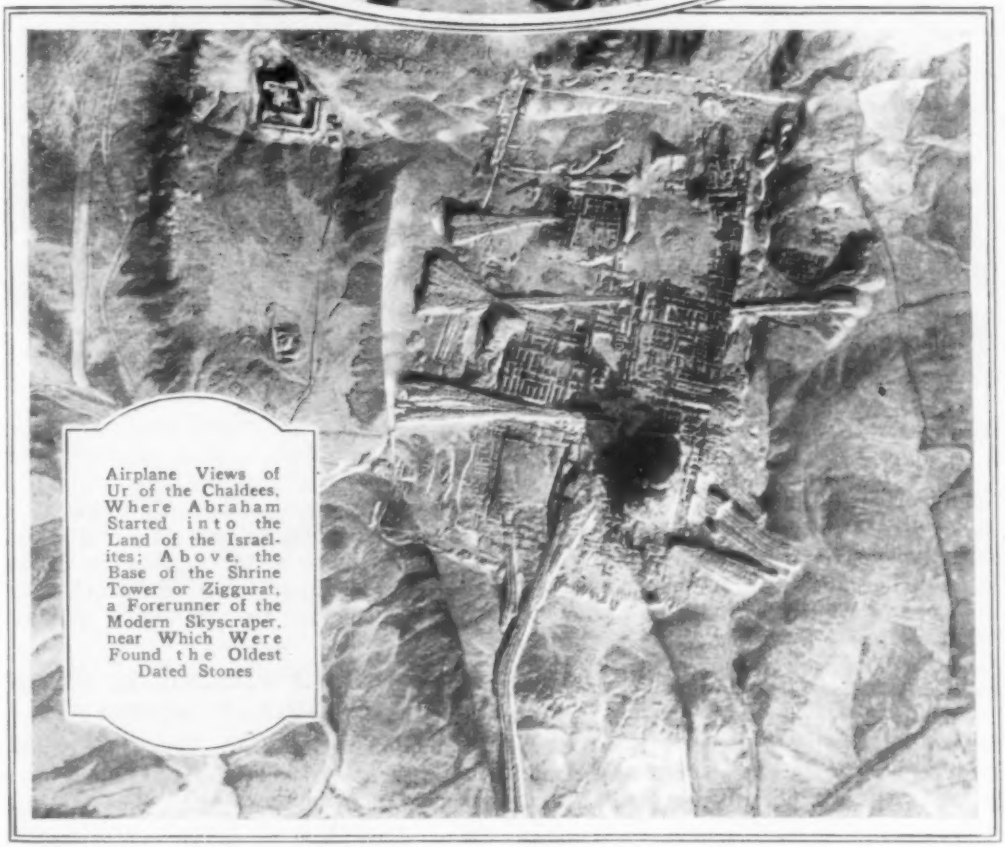
SPRING LOCK FOR BOLT NUTS PROTECTS THREADS



To secure the nut after it has been screwed upon the bolt, a lock of twisted steel is quickly attached. Besides preventing the nut from becoming loose, it protects the threads. It is easily removed.

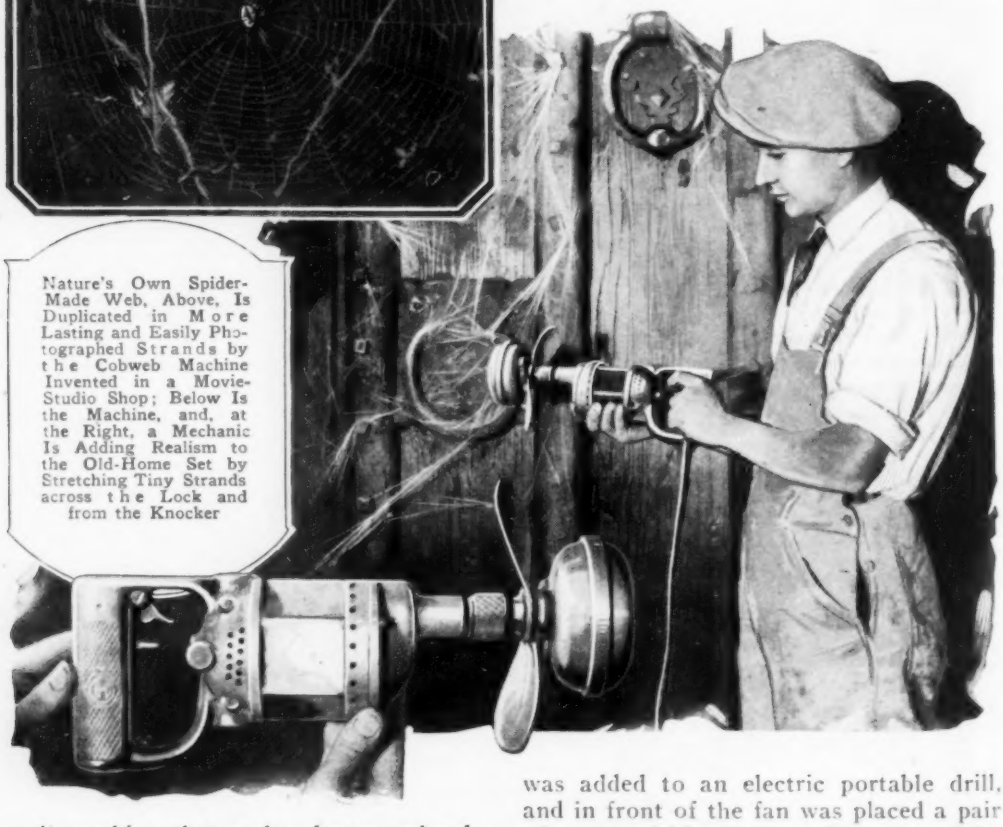
¶A "bug bourse" has been established in Berlin where insects are bought and sold for study.

WHERE THE OLDEST DATED STONES WERE FOUND



Airplane Views of Ur of the Chaldees, Where Abraham Started into the Land of the Israelites; Above, the Base of the Shrine Tower or Ziggurat, a Forerunner of the Modern Skyscraper, near Which Were Found the Oldest Dated Stones

COBWEBS MADE TO ORDER ADD REALISM TO MOVIES



Nature's Own Spider-Made Web, Above, Is Duplicated in More Lasting and Easily Photographed Strands by the Cobweb Machine Invented in a Movie-Studio Shop; Below Is the Machine, and, at the Right, a Mechanic Is Adding Realism to the Old-Home Set by Stretching Tiny Strands across the Lock and from the Knocker

A machine that makes better cobwebs than a spider can produce recently was awarded a patent in Washington. Electricity is driving the spider out of his own business because the movies want their cobwebs in a hurry, just where they want them, and, for photographic purposes, found an artificial cobweb more real than the real thing itself.

For several years special cobweb makers have been employed to build the realism into sets representing ancient and dusty places. With a pot of glue and a stick they trailed long strands patiently through the air and built cobwebs across corners and dangling from lamps and beams. The work was slow and laborious, and then the intense heat of the studio lights soon melted the filmy webs away, so that it all had to be done over again.

Then a movie mechanic, watching a candy-floss machine, got an idea and made the first electric spider. A two-bladed fan was added to an electric portable drill, and in front of the fan was placed a pair of cups, with a space, where they join, through which the cobweb material, a mixture of liquid rubber, glue and ether, can ooze. The air from the fan drives the heavy liquid off in strings, which hang to whatever they touch and dry quickly.

HUMAN-HAIR STOCKINGS WORN BY RICE-FIELD WORKERS

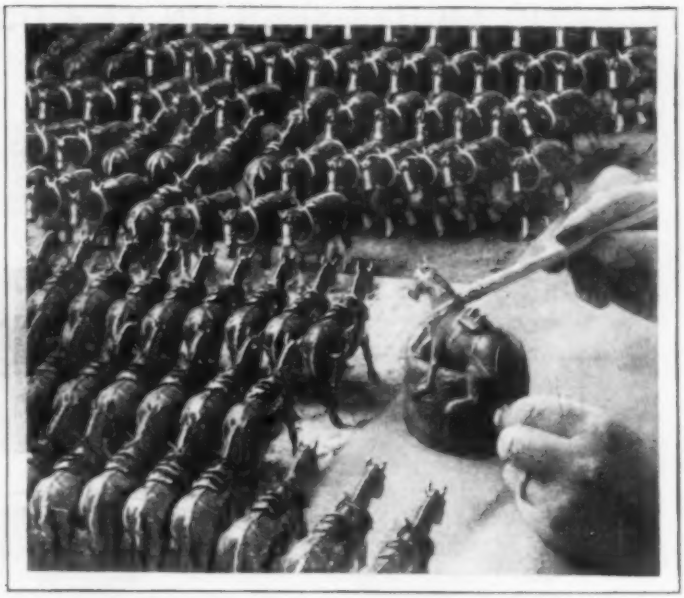
In a Japanese household the hair combings are saved until there is enough to make a pair of stockings. The strands are spun into long threads and woven into hose of varying qualities, the best of

which are eagerly sought by workers in the rice fields. These stockings are worn over the ordinary hose, the belief being that human hair is a preventive of cold to those subjected to constant exposure in the inundated rice fields.

FOREST RANGER'S BRIDGE AIDS IN FIRE FIGHTING

Thanks to a forest ranger's ingenuity, autos can now be driven across the Chetco river, in the Siskiyou national forest in Washington, and swifter access gained to the region in case of fires or other emergencies. The structure was largely made from rough materials taken from the woods, low timber piers, stringers and cross members with three-inch planks hauled from the nearest sawmill and laid lengthwise. Poles fastened to the piers serve to keep the wheels on the planks. The bridge is now used by the half dozen settlers along the road who aided in the undertaking.

Helping the Auto through the Mountains, a Forest Ranger's Bridge in the Siskiyou National Preserve



Painting Toy Horses, Freshly Cast from Shrapnel That Was Intended for Guns of War; Tons of the Metal Are Being Used

SHRAPNEL TURNED INTO TOYS AS PEACE-TIME SERVICE

Another instance of war materials being used for the purposes of peace is seen at an English factory where shrapnel removed from shells is being melted and cast into toy models of horses and other animals. Nearly 300 tons of the metal has been prepared for the castings and a large staff of craftsmen is employed in the work of producing, painting and finishing the interesting and well-executed toys for the market.

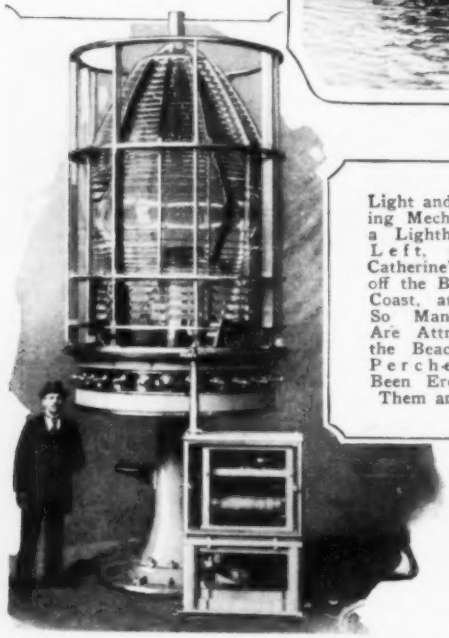
ICE SAW RUN BY SMALL MOTOR TRAVELS STRAIGHT LINE

Mounted on sled runners and propelled by traction from the saw teeth, an ice cutter run by a small automobile motor, travels at the rate of 175 to 200 feet a minute, depending upon the depth of the cut, and is so constructed as to reduce vibration to a minimum. A double chain drive permits an equalized pull and the cutter is equipped with a gauge that insures an absolutely straight line of travel. In the December issue of Popular Mechanics, this cutter was erroneously described as being propelled by means of a caterpillar or roller type of drive.

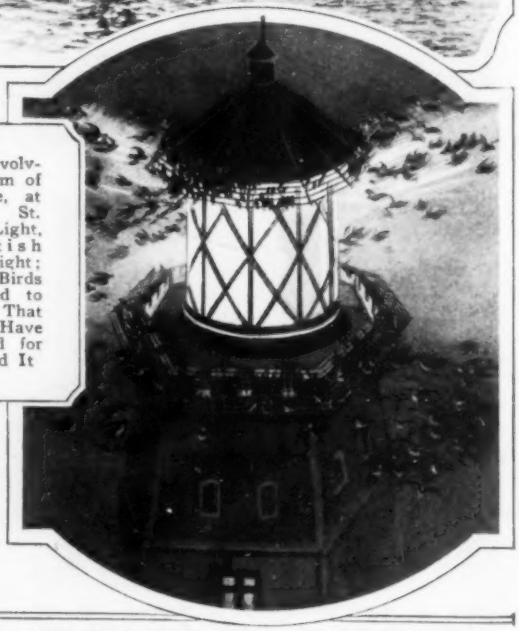
TRAFFIC LIGHTS SEEN ON THE OCEAN HIGHWAYS

Automatic Gas Buoy, Showing the Underwater Tank That Holds the Fuel, and, at Right, Type of Lightship Employed off English Coasts

Traffic Lights at Sea Are Sometimes Run Down by Reckless "Drivers," as This Mast of a Ship That Failed to Heed the Warning Signal Shows



Light and Revolving Mechanism of a Lighthouse, at Left, and St. Catherine's Light, off the British Coast, at Right; So Many Birds Are Attracted to the Beacon That Perches Have Been Erected for Them around It



From Prof. J. Arthur Thompson's "The New Natural History," Courtesy G. P. Putnam's Sons

HORSES' SHADOWS HIDE TROOPERS FROM AIRMEN

By letting their horses graze, dismounting and hiding in the shadows of the beasts, a troop of cavalrymen successfully escaped detection by airmen during a test at the Ft. Riley cavalry school. The country near by was a stock-raising region so that the presence of a number of horses in one field did not attract attention and the animals were permitted to wander at their will so that the irregular formation deceived the observers in the plane. Blankets, saddles and other equipment blended with the color of the horses so that they were not noticed. The ruse was the idea of the commander.

From Furnace to Dance Hall; Rustic Pavilion over Old Gun Forge, Where Couples Swing Merrily to Music by Radio

COLOR AS BLOOD-POISON CURE TESTED WITH DYES

Progress in treating blood poisoning with dyes has been reported by Dr. John W. Churchman of Cornell university. The diphtheria bacillus was shown to be quite susceptible to gentian violet, which was used in freeing the amputation stumps of American war wounded of this infection, and diseased knee joints were sterilized with the same dye. Aniline dyes are also proving effective in the treatment of surface infections. There is little evidence that the substances kill living bacteria floating in the blood, according to Dr. Churchman, but they alter the course of the blood poisoning.

DANCE HALL IS BUILT ON TOP OF OLD FURNACE

Ruins of a furnace near Carlisle, Pa., used by the early settlers for forging guns, have been converted into a moonlight dance hall for which music is furnished by radio. The structure also serves as an observation tower for the state foresters.

BOXES ARE HUNG IN CIGAR CASE FOR NEATER APPEARANCE

Terraced Cigar Cabinet Gives Better Display

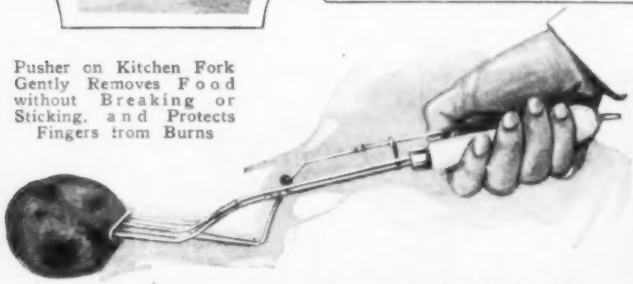
Selection is more easily made and the boxes present a neater appearance in a case with shelves from which the containers are suspended, so that boxes on each rest at the same level, whether deep or shallow. When a sale is made, the perpendicular glass between the shelves is raised and lowered by levers at the rear of the case and the entire cabinet is locked with a knob.

Time and Money

Adjustable Ironing Board Can Be Raised or Lowered to Various Heights, Permitting Use While Sitting Down, If Desired to Rest the Feet; It Folds Up Flat for Storing in Small Space

For Making Tea or Coffee, This Attachment Fits Ordinary Pot or Electric Percolator; After Water Seeps through Contents, Handle Is Raised, Permitting Liquid to Drip into Pot

Pusher on Kitchen Fork Gently Removes Food without Breaking or Sticking, and Protects Fingers from Burns



Compact Ironing Outfit with Cord, Carried in Washable Bag, Is Convenient in Traveling; the Handle Is Detachable and the Iron, Turned Upside Down, Slips into the Stand

Portable Radiant Heater Burns Gasoline, a Gallon Being Sufficient for Eight Hours' Steady Use; Pump on Right Supplies Air, and Gas Is Generated Quickly

Anyone wishing further information on devices described in the editorial pages can

Saving Things for Your Home

Broiler, with Pan Below to Catch Juice for Gravy, Eliminates Fires and Smoke While Preparing Steaks

Safety Knife Sharpener Is Shielded, to Protect the Fingers, and Is Said to Give a Keener and More Durable Edge without Wearing Down the Steel

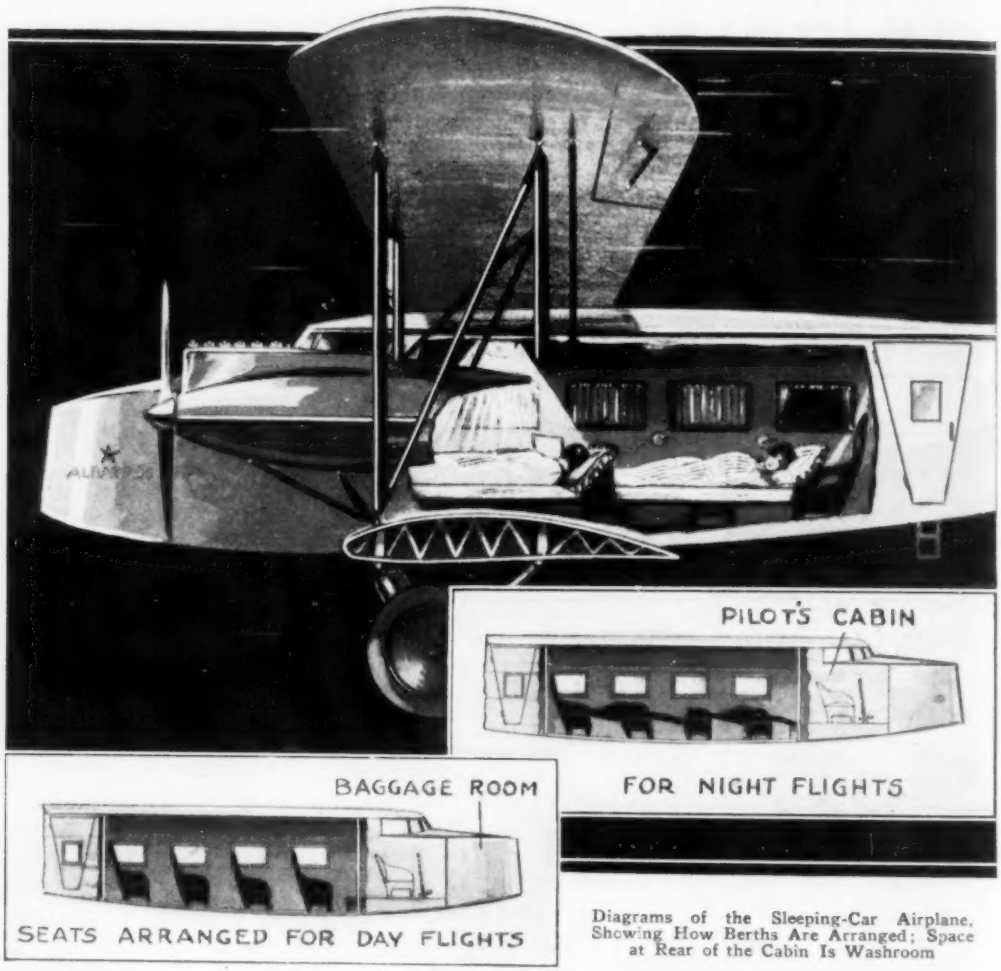
Folding Kitchen Table on Wheels Is a Serving Cart and Stand in One Article; Rubber Tires Prevent Noise and Scratches; the Top Is of Enameled Steel

Bath Stool Has Compartment and Adjustable Rest Inside for Shining Shoes and Storing Equipment; Rubber Tips on Legs Protect the Floor

Washable Inner Soles to Keep the Feet Comfortable and Lengthen Life of Shoes

obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

PLANE FOR NIGHT FLIGHTS HAS SLEEPING BERTHS



Diagrams of the Sleeping-Car Airplane, Showing How Berths Are Arranged; Space at Rear of the Cabin Is Washroom

Cabin seats in an airplane making night journeys between Berlin and Konigsberg, have hinged backs which may be lowered to form comfortable berths for passengers. A washroom and space for luggage are additional features of this sleeper of the skies. To decrease the weight, fabric has been used in place of all-metal construction, but the struts and skeleton are of steel tubing and duralumin.

HEAT IS HARDER THAN COLD TO KEEP IN VACUUM

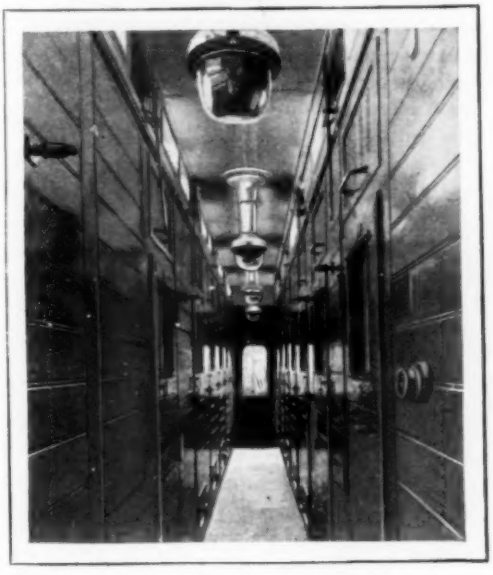
It is easier to keep things cold than hot in a vacuum bottle. The explanation lies in the tendency of heat to rise, and the fact that the opening of the bottle is at the top. The average user thinks of heat and cold as two separate things, but the bottle manufacturer knows he is dealing with only one factor, heat, which is why the bottle neck is always made as small as possible, yet of sufficient size to provide room for introducing the contents. Hot liquids or foods can be kept warm for a longer time by turning the bottle upside down, to get the neck leakage at the bottom. One manufacturer of large vacuum shipping cans for milk found in experiments that the rise in heat in the contents of a five-gallon can was sufficient to produce a temperature difference of as much as two or three degrees between the milk in the bottom part of the container and that at the top.

U. S. PRODUCTION OF GOLDFISH TWENTY MILLION YEARLY

More than 190,000 persons in the United States are engaged in fisheries or the fishing industries, a business that represents an investment of $202,000,000, according to the annual report of the bureau of fisheries. Fish culture is steadily developing in this country, supporting the contention that an acre of water can be made to produce as much nourishing food as an acre of land, the report shows. About $200,000 worth of trout eggs are produced by commercial firms each year and surplus fish are marketed at good prices. The annual output of goldfish is approximately 20,000,000, valued at $350,000. More than 150,000 acres of oyster grounds are under lease, from Massachusetts to Florida.

CONVICT RAILWAY COACH HAS CELLS FOR PRISONERS

German prison officials are taking no chances at letting convicts escape while on railroad journeys. A special car, with cells, heavily barred doors and big locks, is used when prisoners are to be transported. The method presents an interesting contrast to the custom in this and some other countries where convicts ride in ordinary cars with guards.



© Henry Miller
Interior of German Convict Car; It Is Essentially a Prison on Wheels

Young Sculptress beside Model of Her Friend; the Bust Forms an Attractive Garden Piece

GIRL MODELS CHUM IN CEMENT AS GARDEN ORNAMENT

As a mark of esteem for her girl friend, a young woman in Illinois modeled her portrait in cement and set it upon a slender pedestal in the garden. She took the idea from Lorado Taft's statue of "Blackhawk" on the cliffs of the Rock river.

HOUSES TO RESIST CYCLONES MUST BE WELL BRACED

Engineers of the lumber manufacturers' association have pointed out two precautions that should be followed in building a house, to make it as strong as possible against tornadoes. The suggestions were developed after inspection of the destructive effects of hurricanes in the south. A first requisite, the engineers hold, is that the sills of the building should be strongly anchored to a monolithic concrete foundation which should be as massive and deep as cost considerations will permit. In the second place, the roof structure should be strongly bolted or nailed to the wall and afford little opportunity for the wind to take effect under the eaves.

Using the Wind to Aid the Skis; Kite Pulling Runner over Smooth Snow

KITE CARRIED BY SKI RUNNER SERVES AS TRACTOR

Ski runners prefer calm days as the wind often proves a serious handicap. But a way has been found to harness the breezes by using a special kite. It is held by five guy strings which keep it at such an angle that a wind of moderate strength will cause it to pull the ski runner along on smooth snow or ice.

ICE PLANT TO COOL REINDEER IN SOUTHERN PARK

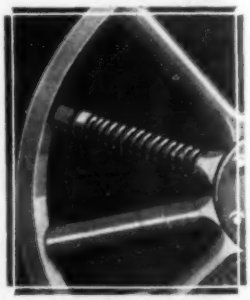
To keep six reindeer in a Dallas, Tex., park cool and comfortable, an ice plant with ventilating system is to be installed in a small inclosure on their lot. The plan was adopted when one of the animals died shortly after arriving from its northern home, owing to the heat.

FAULT-PROOF HOUSE TO SHOW WAY TO BETTER HOMES

To demonstrate the best in building at moderate cost, a test dwelling, near New York city, is designed to be proof against fire, sound, moisture, heat and cold. Materials were selected and used with a view to reducing expense. For instance, the cost of using brass for water-supply pipes was offset by a saving in brick, both whole and broken kiln-run being employed for facing. The builders were instructed to lay up paneling on the outside chimneys in a way to save time and cost. A concrete foundation was laid, and light steel beams were imbedded in the brick walls to carry gypsum floors and partition-wall fill. The steel framing was installed to prevent structural sagging. The house is intended to convince prospective builders that it is practical to erect, for a reasonable amount, a type of dwelling that will not entail high maintenance expense and yet will be comfortable and attractive. It is thought that such an abode would inspire the confidence of investors and stimulate home building and owning.

TIRES PUMPED AS AUTO RUNS THROUGH HOLLOW SPOKE

Automatic pumps that inflate the tires while the car is running, and whenever the pressure gets below a certain point, have been introduced to prolong the life of the tire and save the motorist time and trouble. The pump is contained in a hollow steel spoke of the wheel. The valve of the inner tube fits into this spoke. A plunger is actuated by a short rod extending from the side and coming in contact with a cam on the front axle. With each revolution of the wheel, the plunger makes a complete stroke. The pump is regulated according to the strength of its spring. For instance, if the tire pressure goes below thirty-five pounds, the plunger will begin to pump in air until the normal pressure is restored.



Redwood Forest of Today; Fossil Oak Leaf; Prof. Chaney Studying Fossil Specimens, and a Giant Petrified Tree; from Relics Such as These, Scientists Endeavor to Picture the Past

FOSSILS GIVE PICTURE OF LIFE MILLION YEARS AGO

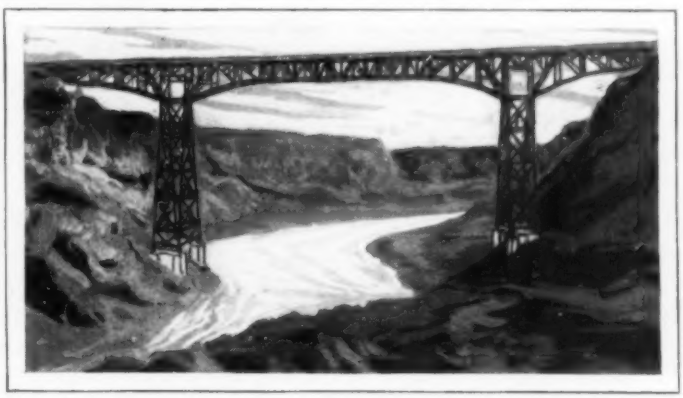
Redwood forests 1,000,000 years ago covered a much wider area than they do now, according to Prof. R. W. Chaney of the University of California. This is the conclusion from fossils found in parts of the state where the trees long since have disappeared. Petrified trunks and imprints of leaves give investigators clues to the character and extent of vegetation many centuries ago.

RADIO ATTACHMENT FOR PIANO ELIMINATES MICROPHONE

Connected to the sounding board of a piano, a radio unit permits broadcasting music from the instrument without a microphone and, in receiving, converts the piano into a huge loud speaker. According to reports of experiments with the device, it improves the tone qualities, especially of piano numbers, while the metallic sounds and microphonic roaring are entirely eliminated. Manufacturers see a stimulus to the piano business as a result of this invention, and some are planning to substitute it, a radio set and talking machine for the self-playing apparatus. In broadcasting, the unit is connected directly to the amplifier circuit and, for receiving, it is wired to the radio set.

HIGH BRIDGE SPANNING CHASM TO SERVE MOTOR TOURISTS

Motorists who desire to visit the inner regions of Idaho will be spared a long and dangerous grade crossing over the Snake river by the high bridge which is being constructed over the stream near Twin Falls. It will be 1,400 feet long and 476 feet high, one of the loftiest in the world. The cost is estimated at $650,000. The Snake river is famous for its bridges. Just a few miles upstream from the one now under construction, a suspension bridge, 345 feet high, spans the canyon.



Sketch of High Bridge over Snake River as It Will Appear When Finished; It Will Link Two Counties

Forest Rangers Weighing a Sample from the Five-Foot Snowfall in Holy Cross National Forest, Colorado, in Order to Determine Its Density and Water Content

Fighting Summer Fires with Winter Snows

Danger Periods Detected and Warnings Issued as Result of Survey That Keeps Check on the Moisture

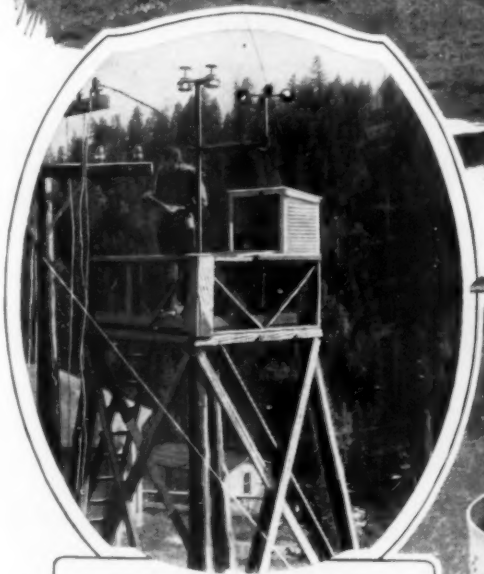
LOCATIONS for next summer's dangerous forest fires are being picked out now by forest service rangers and arrangements made to fight the conflagrations that will be started by lightning, and bar campers from the government forests during the danger period.

Ability to pick out in the winter the places where the following summer's worst fires will occur has come as one result of the extension of the weather bureau's work to the forestry service. The conditions which cause forest fires to reach dangerous proportions are the direct result of light snowfalls during the winter, so constant check of the weather during the last few months has given the rangers a fair idea of what the coming summer's work will be.

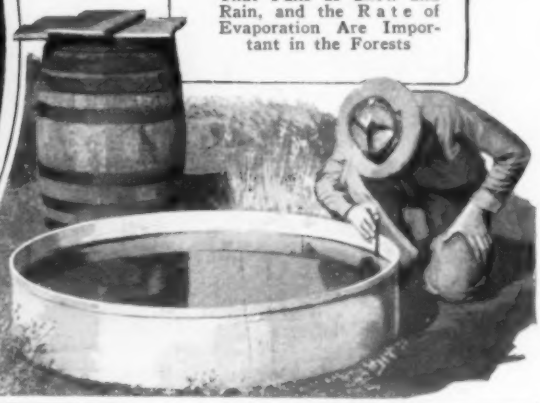
The weather-reporting service in the national forests is only three years old, but already it has uncovered so much important information about the effect of low relative humidity and wind conditions on forest fires that the service has hopes of mastering the subject thoroughly and of enabling the rangers to anticipate danger and be prepared to snuff out bad fires as soon as they break out. Starting in the western states, the fire weather-warning service issued during the summer months has been extended to all the northern and eastern states having either national or state forests. From Washington a careful check is kept on conditions in each state, and, whenever they approach the combination which has been found to be most adapted to spreading fires, a special warning is sent out, and wardens and forest rangers recruit their forces and prepare to give fight before the fires spread.

Snowfall surveys made during the winter form the main basis of the service. Weather-bureau markers, laid off in feet, have been erected throughout the forests to measure the depth of winter snow, and

Regular Weather-Reporting Stations Are Maintained throughout the National Forests; Little Latticed Houses, Like That at the Right, Protect Thermometers and Delicate Instruments from Damage, Yet Keep Them Exposed to the Weather; Below Is a Typical Station with Electrical Wind-Velocity and Other Recorders, Which Write Their Own Record from Minute to Minute on Clock-Driven Charts in Some Distant Ranger Cabin



The Amount of Moisture That Falls as Snow and Rain, and the Rate of Evaporation Are Important in the Forests



Above Is the Weather Tower at the Rocky Mountain Experiment Station Where Seedlings for Reforestation Are Grown

in addition the rangers who take the frequent readings also carry scales and a tube in which they take up a sample of the snow and weigh it to get its density —the gauge of its water content. After the snow has disappeared, they continue to check the moisture in the ground, to determine whether the moss and fallen leaves and pine needles are damp enough to prevent their burning. At the same time daily readings of the relative humidity, or moisture in the air, and the wind velocity and direction enable the weather bureau to calculate exactly when the danger period arrives and ends.

The value of the weather service, however, is not confined altogether to fire prevention. One of the most complete weather-bureau observation posts in the country has been installed at the Rocky mountain forest-experiment station, a huge government nursery where seedlings for reforestation are raised and forest problems studied. Wind direction and velocity recorders, high and low-temperature thermometers, recording barometers, psychrometers for measuring humidity and other instruments, are checked daily, and their readings compared with the growth of the trees, to determine the effect of various kinds of weather on plant growth.

Here, the forestry service starts its seedlings in greenhouses where the daytime temperature is kept at seventy-seven degrees and that at night at fifty-seven, for it has found that this range is best suited to the plants. It likewise knows that the yellow-pine seedlings should be planted on southern exposures, where the ground temperature at midday may be thirty to fifty degrees higher than on the cool northern slopes, where the spruce and Douglas fir thrive.

The fire-warning service has been so successful that many of the lumber camps in the west shut down immediately when dangerous conditions are reported, in order to avoid possibility of starting a fire from sparks from the engines. One lumber operator, who declined to heed a warning last year, lost $60,000 worth of logs and equipment in a fire that occurred the same day the warning was issued.

ELECTRIC LIGHT ON HEN COOP TO FOIL THIEVES

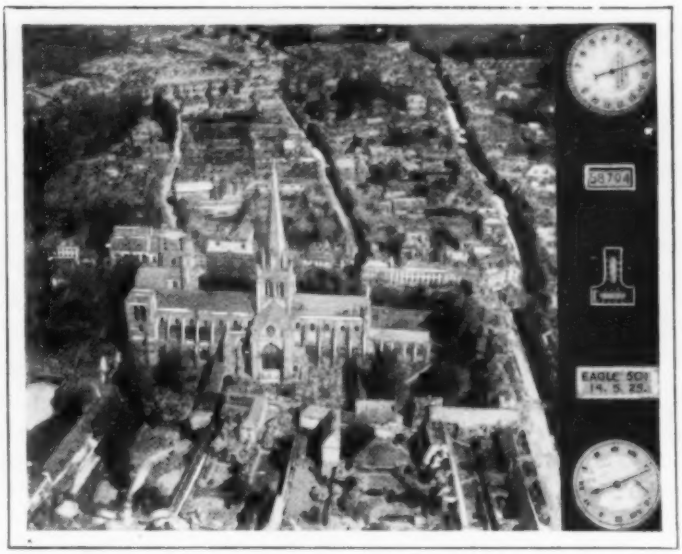
To stop further thefts of his fowls, a Texas poultry raiser placed an electric light on the coop and adjusted it in such a way that, when the door was opened, the high-powered bulb was illuminated and a bell rang. The arrangement proved successful, according to the police.

Photos Courtesy U. S. Weather Bureau

Snow Markers Are Only Painted for Five-Foot Depths; Frequently the Forest Ranger Has to Dig Down to Find the Board, and Then Measure Up to the Top of the Snowfall

NEW RAY TO STOP ANCHOR ICE

Having had marked success in destroying ice jams by blowing them up with thermite, a heat-producing mixture, Dr. Howard T. Barnes, of McGill university, is endeavoring to prevent the formation of anchor ice, that which accumulates near the bottom of open water. For this purpose, he has devised a lamp which projects a special ray, intended to imitate sunlight in keeping the water below the surface free from ice. Tests of the ray in the upper St. Lawrence river were to be supplemented by the taking of photographs of ice "growing" under water. An ordinary camera, shielded to keep out moisture, and a special optical device to obtain proper lighting, were prepared for this particular work.



Oblique Picture Taken with New Aerial Camera, Showing Strip Which Records Time, Altitude, Angle and Other Information

AIR PHOTOS RECORD THE TIME, PLACE AND HEIGHT

An English aerial mapping camera not only photographs the ground, but on a strip at the edge of the same negative notes the time, the altitude, the angle at which the picture was taken, gives the film a serial number and provides a space for special identification marks, including the title and date. The camera can be set to take pictures automatically at the proper interval for any given height, so that when the separate negatives are assembled they will overlap sufficiently to permit matching the parts, or it can be operated independently to take snapshots between the timed exposures. In addition, a small electric lamp with red globe, placed in front of the pilot, is operated by the camera, lighting five seconds before each exposure.

MORE POPS PUT INTO POP CORN BY IMPROVED EAR

Pop corn with ears only three inches long but having nearly 1,000 kernels to the ear has been developed by an Iowa corn specialist through crossing a stub variety with a high grade of sweet corn. It is said to yield twenty-four sacks of popped corn to the pound, whereas the ordinary kind gives but twelve or fifteen sacks. In the selection process, the chief objectives were maximum yield per acre, tenderness and flavor, and maximum number of kernels.

Pop-Corn Culturist with Sample Ears of the New Variety; It Has Nearly 1,000 Kernels to the Ear

When the Swimming Pool Becomes a Game Table; Playing Water Billiards with Floating Balls Gives Many Opportunities for Trick and Fancy Shots

BILLIARDS IN SWIMMING TANK LATEST WATER SPORT

As a diversion between swims, a game of billiards played in the water with balls that float and a regulation cue, has been found popular in a California city. The motion of the pool adds to the difficulty of the shots and allowance has to be made for the resistance of the water, but players declare that the game affords as many opportunities for the exercise of skill as does the table variety.

DOUBLE REAR-VISION MIRROR PROMOTES MOTOR SAFETY

An unobstructed view of the rear of the road is furnished both the driver and the other occupant of the front seat from a

Double Rear-View Mirror Casts Reflections from Side of Road as Well as from Behind

double mirror now on the market. It is easily adjusted to prevent headlight glare from behind, does not interfere with the windshield wiper and its back is protected from the weather by moisture-proof pads. The glass gives a view through both side windows as well as from the rear.

GREYHOUND AS COYOTE KILLER HELPS PROTECT SHEEP

Trained greyhounds have been enlisted by western sheep raisers in the war against the coyote. Two of the dogs made a record in a few weeks last fall when they killed twenty-two of the marauders. Their speed enabled them to overtake the swift coyote and they learned how to work together, one dog grabbing the prey by a hind leg while the other sprang at its throat. In severe winters especially, the coyote does great damage to the flocks and it is a menace to poultry the year around. The government and the states co-operate in efforts to exterminate the animals. Professional hunters and poisoners are employed, and in most western states a bounty is given for a coyote scalp. At certain times of the year, the pelt is valuable for fur. The use of greyhounds is considered unusual, for although the dogs were known to be faster than the coyote, many did not believe that they would be a match for the brutes when cornered, for then the coyote, generally a coward, is a savage fighter.

You Can Build This Box-Type Loop

By HERBERT C. McKAY

MORE and more sets are being designed for use with a loop, and this efficient and convenient collector of energy is gradually replacing the troublesome outside aerial and ground. Many radio owners are not aware that almost any set using five or more tubes will work with a loop, and, by making a few changes, practically any set using a vacuum tube detector.

Loops are of infinite variety, but the type most favored is the box or solenoid. The pancake or concentric form is highly directional, but slightly less sensitive than the box type. While the latter is usually square in shape, it has been found that, by making the vertical sides longer than the horizontal, the loop will be more efficient. This allows more wire in the vertical plane, and as the total length of wire that can be used is limited, the advantages are obvious. In making a loop, the maximum capacity of the condensers in the set must be taken into consideration. If small .00025-mfd. variable condensers are used, the total length of wire should be about 160 ft., for .00035-mfd. condensers, 112 ft., and with .0005-mfd. condensers, about 86 ft. A variation of about 10 per cent either way will not matter greatly.

A Simple, but Attractive Box Loop That May Be Made at Home from Scraps of Wood, Some Wire and a Brass Rod

Aside from the wire length, dimensions may be varied to suit the builder's individual taste. The loop shown in the illustration and diagrams, was made from odds and ends, yet the finished assembly presents a neat appearance. The materials required are: Two pieces of ⅜-in. plywood, 7 by 14 in.; one broomstick, 26 in. long; 6 ft. of lampcord, three binding posts, sufficient loop wire to suit the condensers in the set, and a phone or horn plug. The two end supports and the feet are cut from the plywood. One piece of plywood is laid out as shown in Fig. 1, and supplies one support and two feet, as shown in Figs. 2 and 3. The other piece is laid out in the same manner, but only the support piece is cut from this. Before boring the center holes in the supports, the broomstick is cut to length and the lower end tapered; then the hole in the lower support is drilled so that it will be a tight fit on the stick when driven on 2½ in. from the end. The top support is bored a drive fit for the top of the stick. Before mounting the supports, lay out and saw the wire slots. Starting at the center of each support, square marks across the circular edges, ½ in. apart, and make a saw cut on each mark, exactly ¼ in. deep. This completes the supports.

The foot piece shown in the lower sketch, Fig. 3, has a ½ by ½-in. notch cut in the center of the upper edge; the other foot has a similar notch in the lower edge, so that the two pieces lock together at right angles. After the joint has been glued and the glue has set, a hole is drilled vertically through the joint to take the spindle of the loop. The hole should be a close, but not a binding, fit for the 3/16-in. brass spindle; the bottom of the broomstick is drilled as shown in the diagram for the spindle.

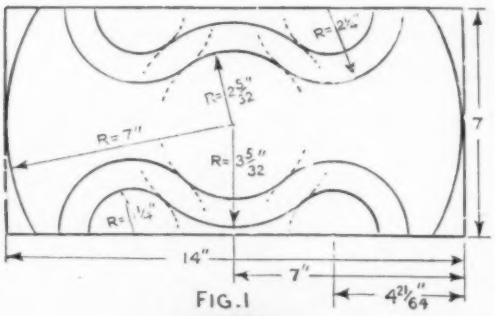


FIG. 1

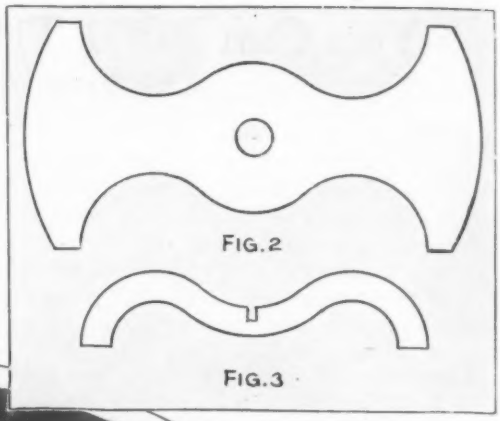
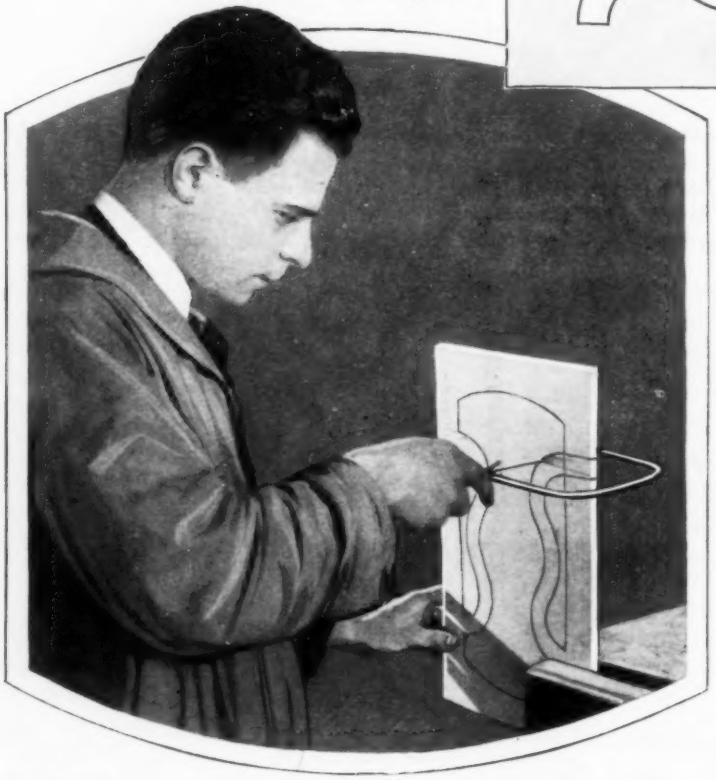
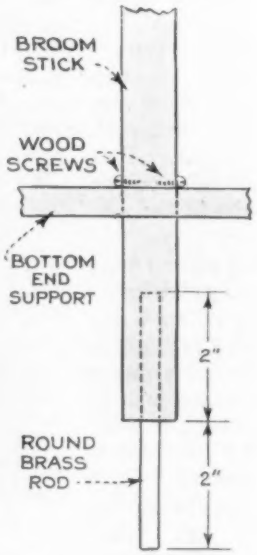


FIG. 2

FIG. 3





In the assembly, the bottom support is driven onto the stick, then two small round-head wood screws are driven into the stick just above the support. Next, the upper support is forced into place, taking care to keep it parallel with the lower one, and a heavy screw is driven into the top of the stick to act as a wedge. The assembly is stained to match the cabinet, and, when this is dry, a coat of shellac is applied. After several hours' drying this is followed by several coats of good furniture wax, well polished.

Three binding posts are mounted on the lower support, as shown in Fig. 4. Using standard silk-covered loop wire, bare one end of the coil, and solder it to one of the outer binding posts. Wind the wire in the slots, stretching it enough to prevent sag. When all the wire is wound on the frame, solder the free end to the other outside binding post. The center binding post is connected to a separate lead taken from the exact center of the winding. Scrape the insulation carefully so as not to cut the small wires, and solder this lead carefully. If the wire is of the enameled type, the enamel must also be scraped off before soldering the connections. Set the loop on the foot piece, and it is ready for use.

Sets that are not designed for use with

a loop, will, of course, not give as much volume with the loop, and its use is not advised for long-distance reception with sets of this type. Fig. 5 shows the necessary connections for using a loop with the ordinary tuned r. f. sets, without disturbing the wiring of the set. An ordinary horn plug is connected to the outer loop leads, and the set may be used either with the loop or the outside aerial. The double-circuit jack makes this a very simple operation. When the loop is used the tuning coil is cut out entirely, the loop leads going direct to the grid and filament, with the condenser (not shown) shunted. The jack is placed anywhere convenient on the front panel near the tuning coil. The center binding post on the loop is used for superheterodynes, and sets using a three-tap loop. This center tap is also useful with sets employing the common two-tap loop, as one of the outside leads can be dropped and the center lead used, making the loop tune sharper and cut out troublesome local interference. A good loop decreases static, and its directional effect is a great aid in tuning out interfering stations. Weak signals are built up by turning the loop so that it points to the transmitting station.

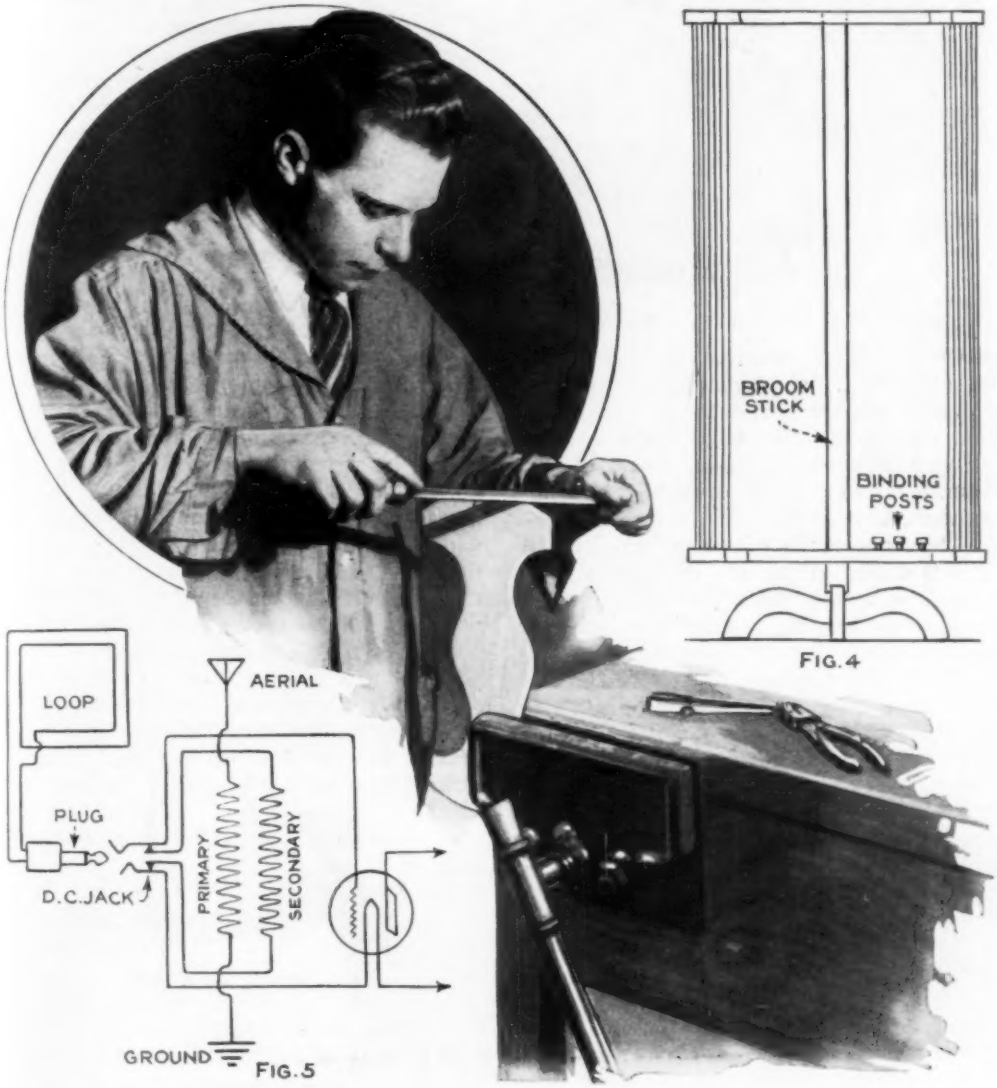
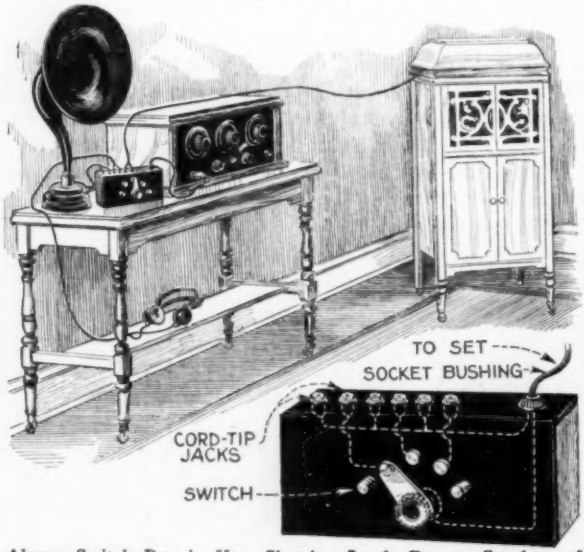


FIG. 5

FIG. 4

Switch Permits Selection of Speaker

A device for switching from one speaker to another, or from speaker to headphones, is shown in the accompanying sketch. The danger of reversing polarity when disconnecting and reconnecting leads, and all other inconveniences, attending such connections, are eliminated by the use of this simple switch box. Make a small wooden box out of ¼-in. stock, 5½ in. long, 3 in. wide and 1¾ in. high, outside measurements. One side and the top of the box are made of scrap bakelite. A hole is drilled at one end of the top panel to take a small rubber bushing, for the leads from the set. Six cord-tip jacks are then mounted in a row on this panel, as shown in the diagram, to receive the tips from the various units; binding posts may be used in place of the jacks, if desired, but the latter make a neater and more convenient job. The bakelite side is now drilled to take a switch lever, and switch points and stops are mounted as shown in the lower right-hand view.



Above, Switch Box in Use, Showing Leads Run to Speakers of Various Types; Lower Right, X-Ray View of the Box

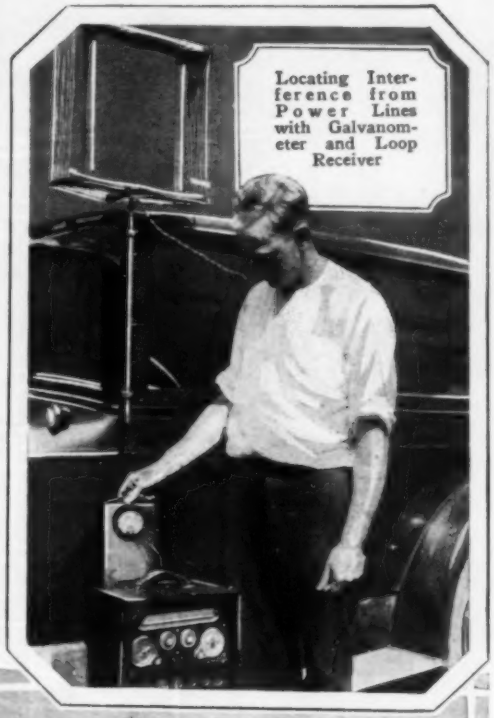
The wiring is very simple, and is indicated in the diagram by the dotted lines. A single phone cord, having tips at one end, makes a neat connection from the switch box to the set. One lead of this cord is connected to the switch lever; the other lead is connected to every other jack. The remaining three jacks are connected separately to the contact points. The wiring inside the box should be done with flexible, insulated wire, so that, when the box is assembled, there will be no danger of breaking the wires, or accidentally making a short circuit. Then the two bakelite sides of the box are screwed in place with small wood screws, after which the box may be stained to match the wood used in the cabinet. It is also a good idea to glue a piece of felt to the bottom of the box, to prevent scratching surfaces on which it may be placed. This little switch box is also practical for the dealer for use when demonstrating speakers of various types. In this case, the number of pairs of jacks used will correspond to the number of speakers to be demonstrated.—W. J. Langan, Freeport, Ill.

Novel Insulator Is Self-Cleaning

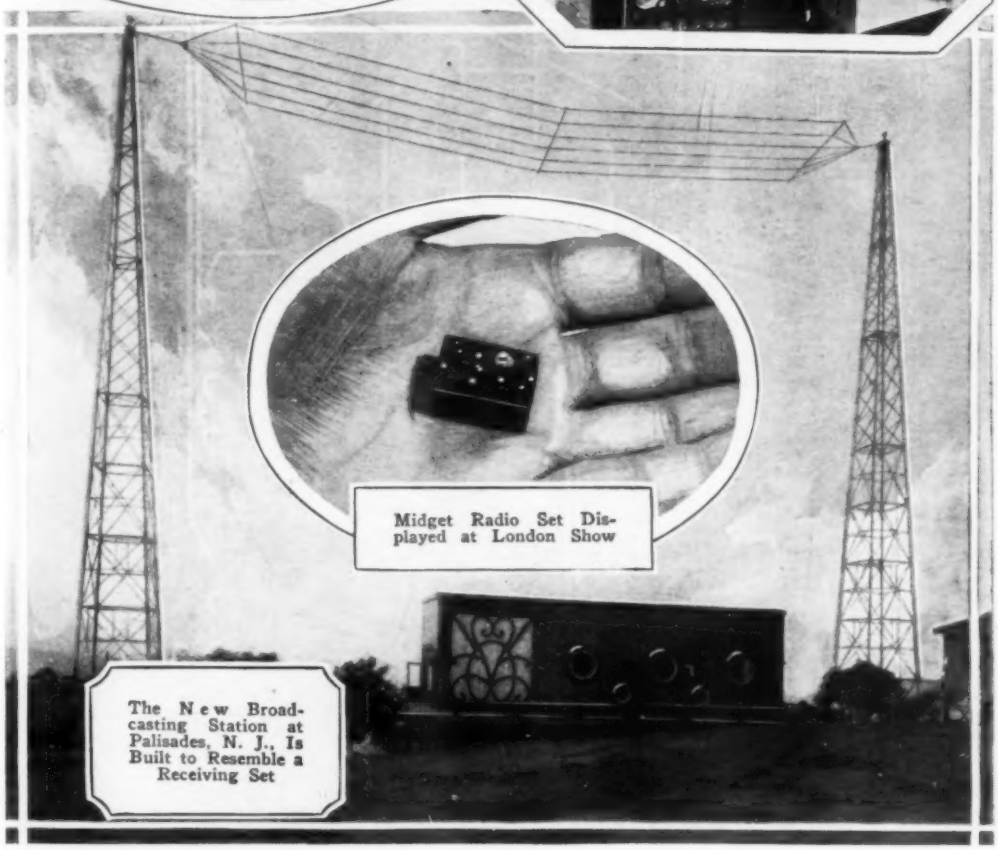
An interesting antenna insulator of the self-cleaning type has recently been put on the market by an English manufacturer. Radio fans living in cities or industrial regions frequently will have noticed a gradual decrease in signal strength if their sets are connected to an outside antenna. This is caused by a deposit on the insulators which allows part of the energy to leak to the ground. The new insulator overcomes this difficulty by means of a small wind-propelled fan, as shown in the illustration. The hard-rubber insulating rod is kept permanently polished and free from deposit by the action of the fan, which is kept rotating by the slightest breath of wind. The center of the fan unit is formed by a hard-rubber bushing that fits easily over the central rod, the rotary unit traveling back and forth on this rod as the wind direction changes. For the British navy, large insulators of this type have been developed, some having a diameter of 18 inches.

Latest Radio Facts and Freaks

World's Smallest Airplane Transmitter Is Built from Scrapped Parts

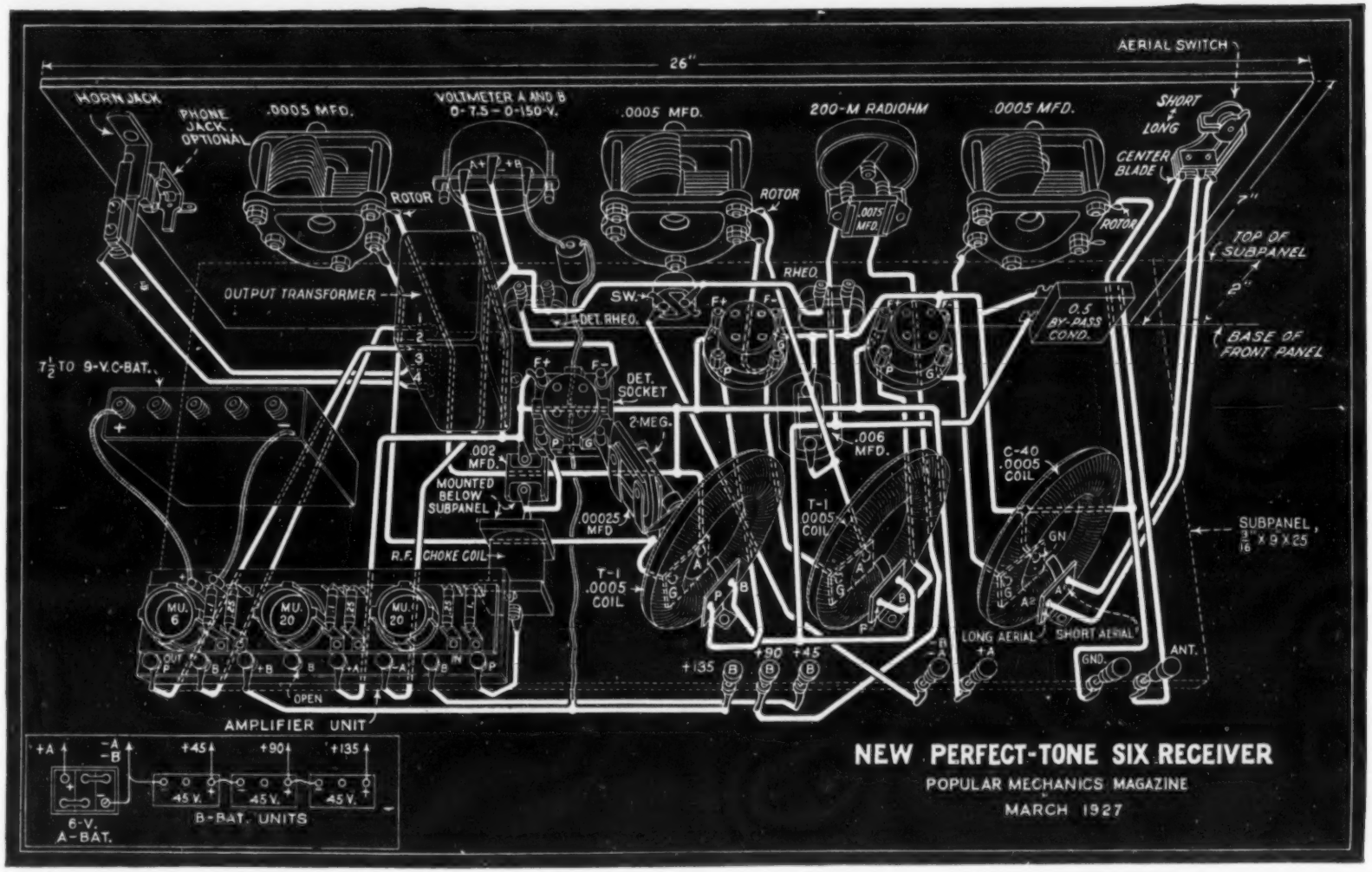


Locating Interference from Power Lines with Galvanometer and Loop Receiver



Midget Radio Set Displayed at London Show

The New Broadcasting Station at Palisades, N. J., Is Built to Resemble a Receiving Set

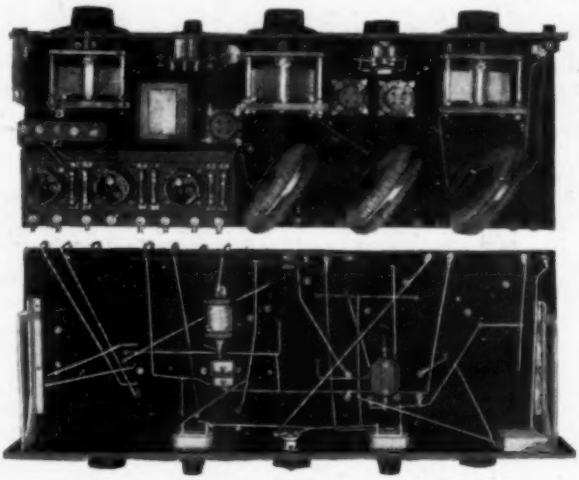

26"
AERIAL SWITCH
HORN JACK
PHONE JACK, OPTIONAL
.0005 MFD.
VOLTMETER A AND B
0-7.5 — 0-150-V.
.0005 MFD.
200-M RADIOHM
.0005 MFD.
SHORT
LONG
CENTER BLADE
ROTOR
ROTOR
.0005 MFD.
ROTOR
7"
TOP OF SUBPANEL
2"
BASE OF FRONT PANEL
OUTPUT TRANSFORMER
RHEO.
SW.
DET. RHEO.
0.5 BY-PASS COND.
7½ TO 9-V.C-BAT.
DET. SOCKET
2-MEG.
.002 MFD.
MOUNTED BELOW SUBPANEL
.006 MFD.
C-40 .0005 COIL
.00025 MFD
T-1 0005 COIL
SUBPANEL 3/16 X 9 X 25
R.F. CHOKE COIL
T-1 .0005 COIL
MU. 6
MU. 20
MU. 20
OUT P
B
+B
B
+A
-A
B
IN P
OPEN
AMPLIFIER UNIT
+135
+90
+45
-B
-A
LONG AERIAL
+A
SHORT AERIAL
GND.
ANT.
+A
-A
-B
+45
+90
+135
45 V.
45 V.
45 V.
6-V. A-BAT.
B-BAT. UNITS
NEW PERFECT-TONE SIX RECEIVER
POPULAR MECHANICS MAGAZINE
MARCH 1927

New Perfect-Tone Six Has Important Improvements

by Frank L. Brittin

WE made no mistake in naming the Perfect-tone six, described in the November, 1925, issue; it has proved one of the most popular sets ever designed in Popular Mechanics radio laboratory. We could not improve the tone, so we tried to improve the set in every other possible way. The result is a receiver equal in many respects to a superheterodyne; it is as easy to build as an ordinary three-tube set, does not howl when tuning from one station to another, and has, in addition, increased range and better selectivity.

An output transformer is used between the power tube and the loud speaker, thus increasing the handling power of the latter, and with a good speaker music is faithfully reproduced in all its original beauty. Perfectly balanced resistance-coupled a. f. amplification, low-loss r. f. coils, and a simple means of suppressing oscillation make this a real set for music lovers, while there is plenty of volume on distant stations for the DX fans, added to simplicity of operation and good selectivity. Those who built the first model will find no change in original parts necessary, the only additions required being a few fixed condensers, an output transformer, a 200,000-ohm variable-resistance, r. f. choke coil, and some changes to be made in the resistance-coupled amplifier.



Top and Bottom Views of the Completed Receiver; Note the Angle at Which the Coils Are Set

The A and B voltmeter is optional with the builder. Do not use the wiring of the old model, but remove all wires, and rebuild the set to conform with the new circuit. For those who are building the set for the first time, all details are shown in the photos and diagrams. The circuit is very simple and anyone who can solder two wires together can build the set. The full-page simplified wiring diagram shows all instruments in their relative positions, and the connections both above and below the subpanel. Before starting the set, carefully study this diagram and the photos. Do not attempt to wire the set from the latter; they are not for that purpose, and it is impossible to trace wires in a small photo.

When selecting the parts, follow the specifications carefully; good parts must be used, for no highly efficient instrument can be built with poor parts. Use solid wire solder, and paste flux. This paste comes in small 10-cent tins, and should be used very

Copyright, 1927, Popular Mechanics Magazine

sparingly; a minute amount applied to the connection is all that is required. Full-sized drilling templates for the panels are available for those who wish them. Mount all the instruments on the front panel first, as shown in the photo above the schematic diagram. The phone jack below the horn jack may be left out if desired, as the volume may be reduced for phones with the variable resistance or with a modulator horn plug. It will be noted in the wiring diagram that no connections are made to the small jack. For those who wish to connect it for phones on detector output only, all that is necessary is extra leads tapped off the B and P input posts of the amplifier unit. This, however, is not advised, as it adds undesirable wiring to the set, and is only suggested for those who requested it on the former model.

Assemble the instruments on the subpanel in the positions shown in the photo; the r. f. coils should be placed at an angle of about 58°, but the exact positions of the other parts are not critical. Place soldering lugs under all terminals that are to be connected, and, when mounting the lugs on the output transformer, be careful that they do not touch the case; then mount the brackets on the subpanel. The front panel is now screwed in position, a small brass angle bracket being used at the rear center of the subpanel for an additional support. Two similar angles hold the C-battery in position, just in front of the amplifier unit.

The set is now ready to be wired. If the amplifier unit is not provided with C-battery posts for the last stage, these posts must be added. An inspection of the underside of the unit will show that one resistor terminal is connected with the A-negative post on the last tube socket by means of a short metal strip. This metal strip and its screws are removed, and two small binding posts are substituted for the screws. The negative side of the C-battery is then connected to the post on the resistor clip and the positive to the negative-A post on the last tube socket. The location of these C-battery posts is clearly shown in the large wiring diagram. Make all leads on the underside of the panel as direct as possible from point to point. Note that the leads to some of the tube sockets are connected to the ends of long screws through the socket bases. This cannot be done with all types of sockets, and if the sockets are not of a type that can be used in this manner, place soldering lugs under the binding posts and drill holes in the subpanel so that the wires may be run up to the lugs. As little wire should be used in the circuit as possible, and it will be found that by keeping the leads separated it is not necessary to use spaghetti. Most of the fixed condensers as well as the r. f. choke coil are mounted under the subpanel. The .5 mfd. by-pass condenser is mounted flat against the back of the front panel in the position shown, and held in place by the subpanel bracket.

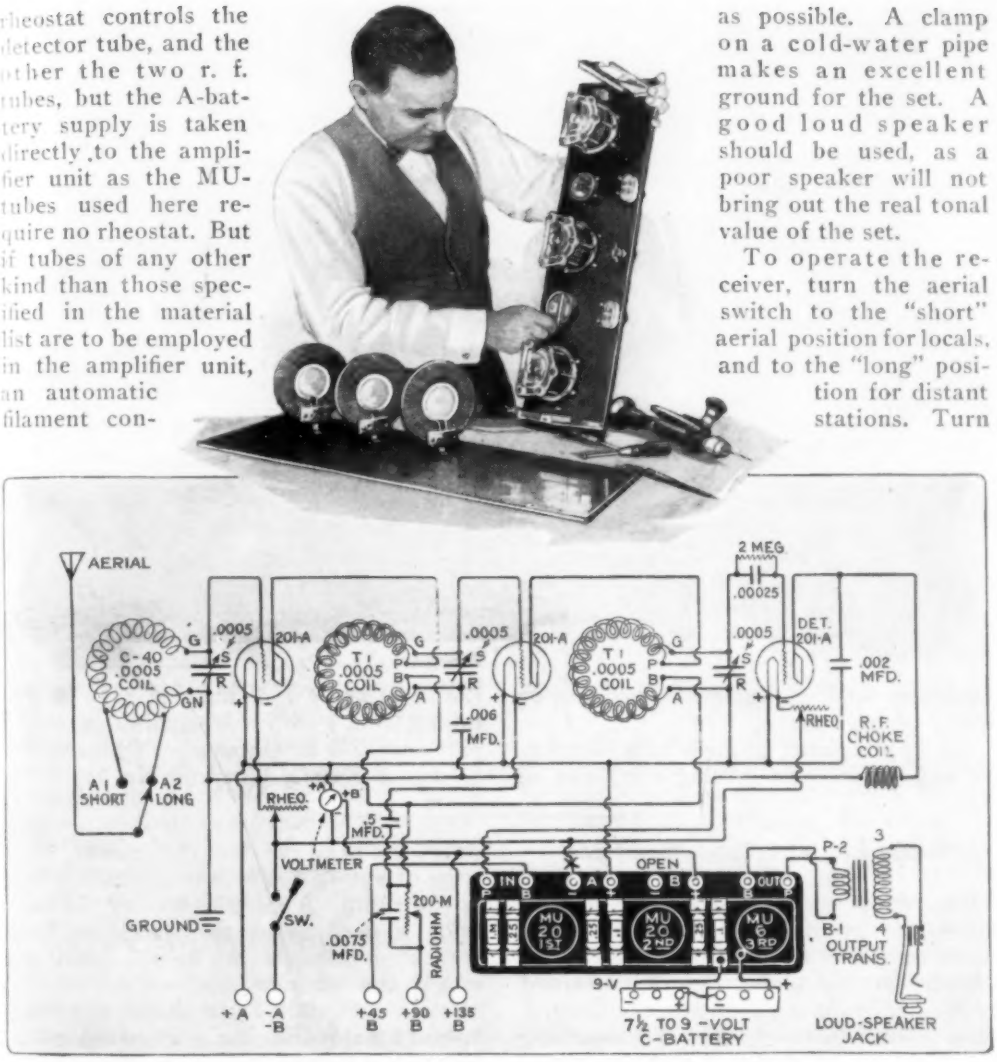
When the wiring is completed, connect the A-battery and test out the filament circuit by placing one tube successively in each socket. It will be noted that one

MATERIAL LIST

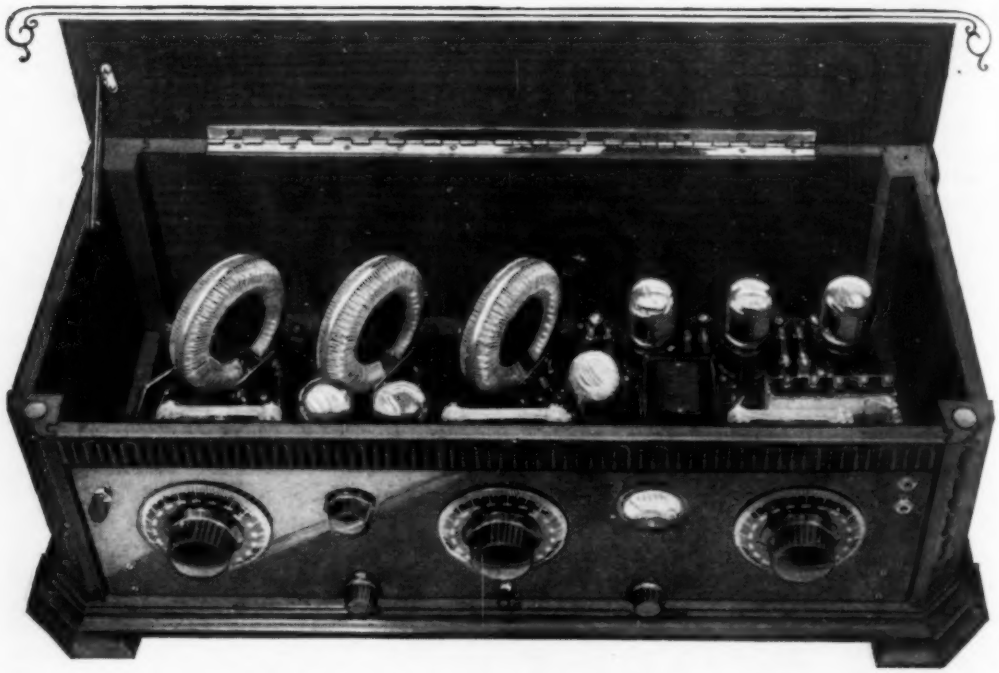
1 front panel, 3-16 by 7 by 26 in.
1 subpanel, 3-16 by 9 by 25 in.
1 set Thorola coils, type 43, for r. f., .0005 mfd.
3 variable condensers, .0005 mfd. (any good straight-line capacity type, not straight-line frequency).
1 Samson r. f. choke coil, type 85.
1 Centralab radiohm, 200,000 ohms.
2 Bradleystats.
1 push-pull switch.
1 Hoyt type 17, or similar type, A and B voltmeter, 0 to 7.5, and 0 to 150 volts.
1 standard open-circuit jack.
1 Gem jack, open circuit, short type.
1 spring-suspended socket, X-type.
2 sockets, X-type, and good low-loss make.
1 Yaxley, midget, aerial switch.
1 S-M output transformer, type 221.
1 three-stage resistance-coupled, a. f. amplifier unit; Daven, Lynch or Muter, with resistors arranged as shown in diagram.
1 pair Benjamin brackets.
1 by-pass condenser, Sangamo or Tobe-Deutschmann, .5 mfd.
1 Sangamo fixed condenser, .006 mfd.
1 Sangamo fixed condenser, .002 mfd.
1 Sangamo fixed condenser, .0075 mfd.
1 Sangamo fixed condenser, .00025 mfd., with gridleak clips.
1 gridleak, cartridge type, 2 meg.
7 binding posts with engraved tops.
1 strip brass, 1-16 by ½ by 6 in., for small brackets.
1 C-battery, 7½ to 9 volts.
2 Daven MU-20 tubes.
1 Daven MU-6 tube.
3 tubes, 201-A or 301-A type.
17 6-32 round-head, brass machine screws, ½ in. long.
4 6-32 round-head, brass machine screws, 1½ in. long.
10 6-32 round-head, brass machine screws, 8 in. long.
10 2-ft. lengths No. 14 round tinned-copper busbar.
4 doz. soldering lugs, long round-hole type.

rheostat controls the detector tube, and the other the two r. f. tubes, but the A-battery supply is taken directly to the amplifier unit as the MU-tubes used here require no rheostat. But if tubes of any other kind than those specified in the material list are to be employed in the amplifier unit, an automatic filament control, either a ballast or an amperite, is necessary at the point marked X in the schematic diagram. This is in the direct A-negative lead to the unit. If 201A-type tubes are to be used, employ a ¾-amp. filament control, and if a power tube other than the ones specified, use a 1-amp. Do not attempt to place mixed tubes of the standard and MU-types in the amplifier unit. When the filament circuit is found to be correct, connect the B-batteries, ground and aerial wires. Use a single-wire aerial, 80 to 100 ft. long, including the lead-in, and as short a ground wire as possible. A clamp on a cold-water pipe makes an excellent ground for the set. A good loud speaker should be used, as a poor speaker will not bring out the real tonal value of the set.

To operate the receiver, turn the aerial switch to the "short" aerial position for locals, and to the "long" position for distant stations. Turn on the filament switch, plug in the speaker, and slowly turn on the rheostats until a faint swishing sound is heard in the speaker. Rotate all the dials, in step, until the station comes in clearly; now adjust the radiohm or volume control to give the desired volume, and turn up the rheostats to the point that gives the best results. It will be found that the dial readings will be about the same for all stations, if each dial is adjusted so that it reads 100, or the highest dial reading, when the plates of the condensers are all in. This adjustment can be made with the



Above, Partly Assembled Panel and Subpanel; Below, Schematic Diagram of Set for Those Who Prefer to Work from One of This Type

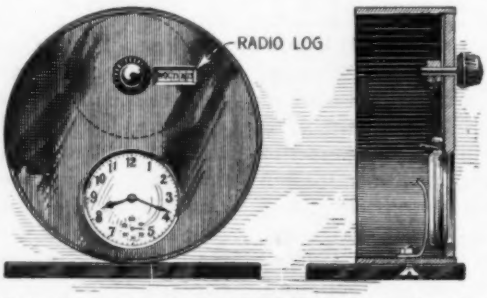


setscrews holding the dials in position on the condenser shafts.

Large blueprints of the wiring diagram, as well as full-size drilling templates of the front panel and subpanel, may be obtained from Popular Mechanics radio department, 200 E. Ontario st., Chicago, for 15 cents. Specify blueprint No. 118.

Radio Log and Clock Combined

Two necessary accessories for the radio set—a means of logging stations and a clock or watch to check the time of the various programs listed—are combined in the handy device shown in the illustration. The construction of the mounting is simple. Cut a piece of 4-in. bakelite or cardboard tubing 2 in. long, and square the edges with a file or sandpaper. If cardboard is used, it may be painted black to match the bakelite front disk. The latter is cut from a piece of scrap bakelite so as to fit inside the tubing. Cut out a hole, the size of the watch crystal, below the center point of the disk, smooth the edges with a file and bevel both sides. The watch is held in place by means of a strip of spring brass, mounted as shown at the right. A switch lever or rheostat shaft is used above the watch, to hold a disk of celluloid or bristol board on which the various stations are to be marked. A small slot is cut in the front disk at a point near the edge of the celluloid disk and the edges are beveled neatly. The station disk is mounted on the shaft by means of a nut on either side, to hold it firmly in position. The disk is turned by the knob and the stations are logged through the slot with a pen or pencil. The base is a piece of panel material, 4 in. long and 2 in. wide, in which two holes are drilled and countersunk for flathead machine screws to hold the tubing and to mount the



Left, Front View of Completed Unit, Station-Logging Disk Indicated by Dotted Lines; Right, Section

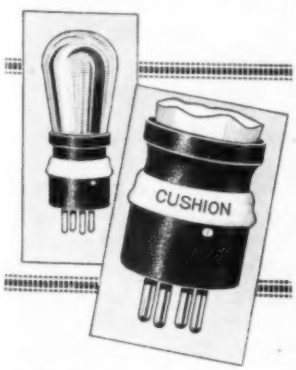
clip for the watch. This may be of the dollar variety, and the assembly looks neat on or near the set.

When Buying Storage Batteries

Remember that the storage battery must deliver sufficient power to operate the set for a reasonable length of time; ampere-hour capacity determines the storage battery's value. If this capacity is accurately represented, the buyer knows just what service to expect. The capacity of a storage battery depends upon the amount of active materials which the battery contains, and the integrity and skill of the manufacturer determine how well the lead plates and the acid solution, which constitute the active battery elements, are proportioned to each other. The size of the case is no indication of capacity; a large box may contain less active material, and therefore less capacity, than a smaller case designed by another manufacturer. Weight is another uncertain indication, nor is the number of plates always a good index of battery capacity. For example, various types of storage batteries, each having a capacity of 100 amp.-hr., have been designed for radio use; one has 9 plates, another has 11 and another 13 plates. All have a true capacity of 100 amp.-hr., and are good batteries.

Tube Has Built-In Cushion

A new tube designed to prevent microphonic noises due to vibration, has a ring of soft resilient crepe rubber in the base of the tube in the position shown in the illustration. With this mounting, set and loudspeaker vibrations will not reach the tube and interfere with the tonal quality, it is claimed. The tubes are designed to fit any standard socket and have the new X-type bases, so that no change in the set is necessary to use them.

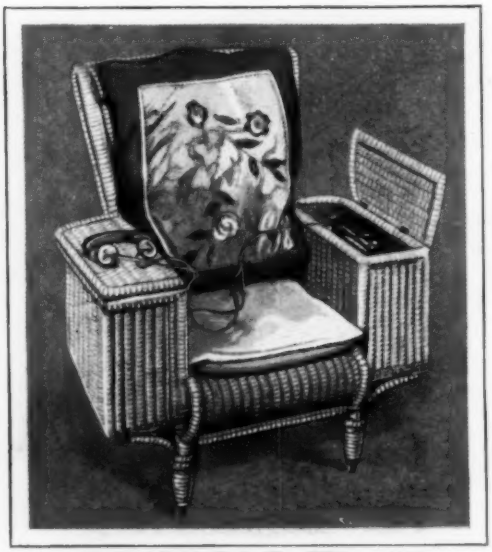


Double-Range Voltmeter, Showing Method of Testing B-Batteries; Below, Mounted on High-Range Stand

Pin-Jack Voltmeter Has Double Range

A practical double-range voltmeter of the pin-jack type is now available for use with any type of receiving set. The instrument is made in two combinations: 4 to 160 volts for use with sets operated with 3-volt tubes, and 8 to 160 volts for use with sets employing 5-volt tubes. The stand is equipped with a pair of 30-in. permanently attached flexible cables for testing the batteries or locating circuit troubles. A pair of pin jacks are supplied with each instrument in order to permit the user to mount them on the panel if desired. Some manufactured sets are already equipped with jacks for this type of voltmeter; the pin jacks should be connected directly to the filament terminals on the bases of the tubes whose voltage is to be measured.

The tinsel used in phone and loudspeaker cords is easily broken, and is very difficult to solder, as it has a tendency to burn. Hence it is best to replace a broken horn or phone cord with a new one. If a tip comes off, wind a short length of fine wire around the bared tinsel end before applying the soldering iron. Be sure the iron is not too hot and use flux sparingly.



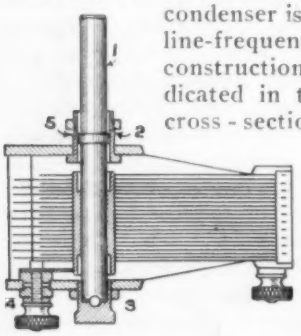
Radio Armchair, Showing Lid of Receiver Compartment Open

Armchair with Built-In Receiver

A novel radio receiver in the form of an armchair was exhibited at a show recently held in London. Each arm of the chair is a wicker box containing radio apparatus, the set on one side and batteries on the other. Placing the headphones within easy reach, the listener-in may enjoy radio entertainment without leaving his chair.—H. T. Wilkins, London, Eng.

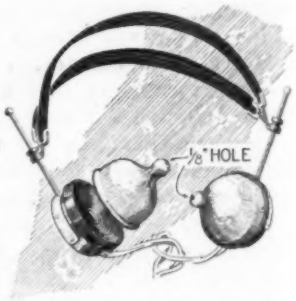
Variable Condenser Employs Shaft of Insulating Material

A variable condenser employing a bakelite shaft strikes a distinctly new note in construction of such instruments. This condenser is of the straight-line-frequency type. The construction details are indicated in the diagram, cross-section view, No. 1 showing the shaft of solid bakelite; No. 2, the brass bushing, acting as a forward bearing and mounting stud, and No. 3, the rear bearing. The insulated binding post, with spring wiping contact for the rotor plates, is shown at 4; No. 5 is a brass contact ring fastened to the shaft. The shaft furnishes the insulation between the rotor and stator plates. The instrument is mounted in a U-shaped frame, eliminating the usual side strips of insulating material and their attendant supporting ribs, and permitting the use of an all-metal frame. The bakelite shaft is claimed to be practically wear-proof, a diameter reduction of only .002 in. being noted after a test of 250,000 revolutions made on a stock shaft.



Headphone Kink for the Deaf

Headphones may be fitted with wide-mouth nursing-bottle nipples for sound concentration. This method has been employed successfully by a member of the staff of one of the large broadcasting stations. By this simple expedient, radio programs are now enjoyed by deaf persons who otherwise would not be able to hear them. The nipples are slipped over the phone unit in the manner shown in the illustration, the small hole at the end of the nipple first being enlarged to about ⅛ in. Phones so equipped are comfortable to the ears. The same kink is suggested for DX listeners, enabling them to pick up faint distant stations.—O. W. Timm, Eagle Rock, Calif.



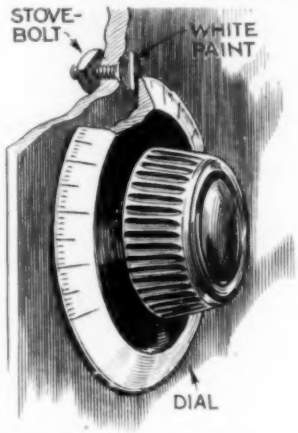
Test Lamp for Storage B-Batteries

The average owner of storage B-batteries has little or no facility for making correct tests on each cell, a procedure that really is of great value, especially after the battery is a year or more old, for then single cells quite often have become defective, rendering the whole battery inoperative. The ordinary pocket meter with a scale reading to 50 volts is of little value when endeavoring to ascertain the condition of a single pair of plates, as they seldom register accurately with so little pressure across the terminals, but a

test lamp possesses all the desirable features that the meter lacks. Get a 3-volt flashlight bulb and solder a short length of stiff copper wire to each of the two contacts on the base. Test your battery, one cell at a time, by touching a wire of the test lamp to the positive and negative terminals. The little bulb should burn with almost normal brilliancy if the cell under test is in good condition and charged, a dim glow or no light at all indicating a defective cell. If only two or three cells in a block of 48 volts are found defective, they may be shorted out by soldering or twisting a bit of copper wire from positive to negative of each offending unit, without noticeably affecting the efficiency of the B-battery as a whole.—J. Walter Briggs, Poughkeepsie, N. Y.

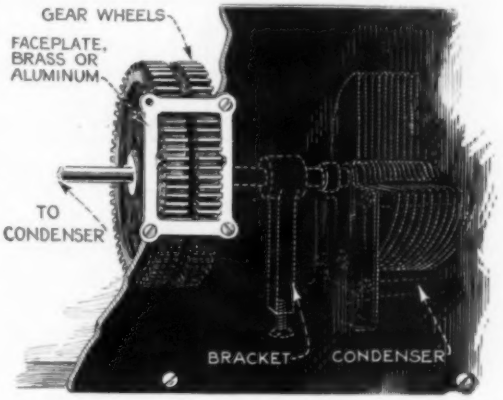
Screw Forms Panel Marker

The simple panel marker for dial setting shown in the drawing consists of a small flat-head machine screw mounted directly above the dial. The head of the screw is countersunk flush with the panel, and the slot is then filled with white lead or similar substance. To lay out the hole for the marker without scratching the panel, clamp a piece of heavy wrapping paper to the panel over the position of the dial. Locate the hole for the condenser shaft, and draw a vertical line through its center. Place the dial temporarily on the shaft and trace the outline of the dial on the paper. At the crossing of the outline of the upper half of the dial with the vertical line, make a center-punch mark, deep enough so that the drill will not slip when drilling the hole. Remove the paper, and drill, and countersink the screw-head hole, then place the marker on the panel.—Geo. F. Helpap, Saginaw, Mich.



Homemade Back-Mounted Dials

Back-mounted dials with a small portion of their edges projecting through the panel for localized control of variable condensers and other units are usually confined to manufactured sets, since they have not been generally available to the home builder. However, the experimenter can obtain the same general results with the gear assembly shown in the illustration, at small cost. A gear taken from a telephone magneto, or one of similar type that may be found about the workshop or secondhand store can be used. The teeth are ground down, and painted in various colors, so that stations can be logged by color. The faceplate is of brass or aluminum, the slot or "window" being cut to suit the gears. By using telescoping tubes for the condenser shafts, several of these wheels may be placed together, or they can be spaced across the panel as desired.



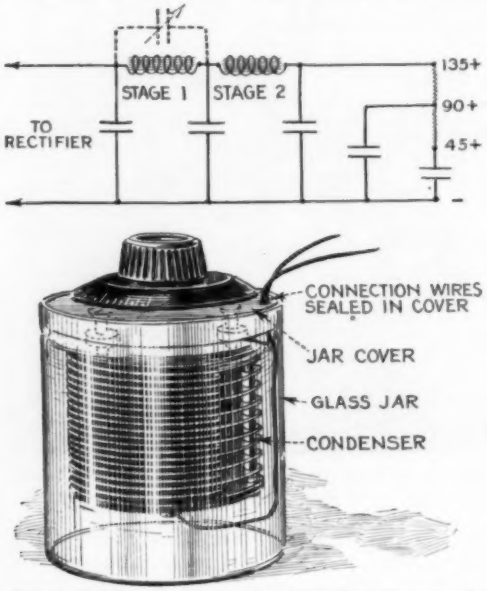
Homemade Back-Mounted Dial That Can Be Easily Made at Small Cost

How to Rejuvenate Dry Cells

Dry cells are never really dry; they contain a moist paste. This fact explains why the cells run down if kept near radiators or in other warm places. Frequently the paste, or "electrolyte," dries up before the other exhaustible elements of the battery weaken; if holes are then punched in the zinc covering of the cells and the entire battery soaked in a strong solution of salt water, they will often show marked signs of rejuvenation for a short while.

Preventing B-Eliminator Hums

Hums are a frequent source of annoyance in many of the cheaper types of B-

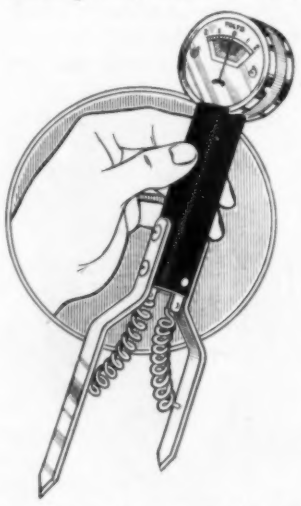


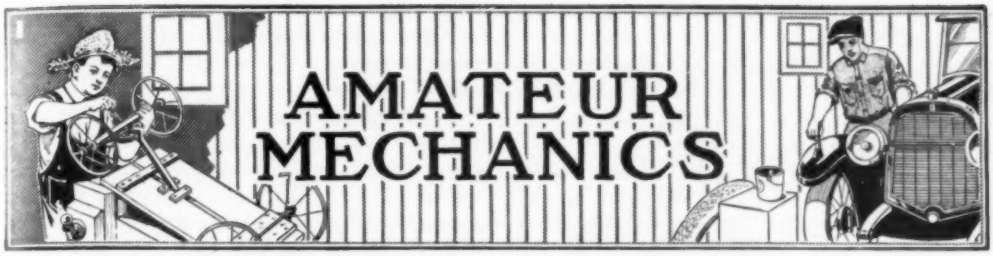
Above, Wiring Diagram Showing Condenser to Be Added in Dotted Lines; Below, Condenser in Jar

eliminators. This annoyance can be done away with by means of the simple home-made apparatus to be described. Without going into the theory, the filter of the eliminator does one of two things. It either short-circuits or chokes the hum left in the current from the rectifier. In the more expensive eliminators, these two functions are combined in the filter, while in the cheaper types the filter is usually designed to short-circuit the hum only. The wiring diagram given herewith shows the hookup of the higher-priced instrument, and a variable condenser is indicated across the first-stage choke coil, in dotted lines. The condenser makes that stage function in the same manner as a wave trap would cut out objectionable stations. If your eliminator does not contain a condenser of this type, it is easy to build and install it in your present equipment. Obtain a .001-mfd. variable condenser with end plates and insulation of bakelite. It need not be of the newer type, an old straight-line capacity condenser being quite suitable. Next provide a covered glass jar that will hold the condenser so that the rotary plates may be moved in and out without obstruction. Mount the condenser on the underside of the cover, with the shaft projecting through the top so that the rotor can be turned when the condenser is in the jar. Fill the jar with distilled water and place the condenser in the jar, taking care that the water covers the topmost plate of the condenser completely. Seal the jar so that no water can spill and you have a condenser of about .081-mfd. capacity, as the dielectric constant of distilled water is 81 times that of air. Connect the condenser in the position shown in the diagram, and adjust the circuit under operating conditions. Turn on all the tubes in the set, and listen for the hum in the loud speaker. Slowly turn the variable condenser from zero to maximum, listening closely for the hum to die. No special care need be taken with the connection wires except that they should be sealed in the cover of the condenser.—Arthur Kennedy, Paterson, N. J.

A-Battery Cell Tester of Novel Design

A cell tester for the A-battery that is used exactly like the cell tester for automotive use is now available. The pointed metal prods, shown in the illustration, are pushed into the terminals of each cell in the battery, and the reading is noted on the small meter conveniently mounted at the end of the handle. A specially designed scale gives directly the different conditions of the battery. The meter has its zero in the center, so that no attention need be paid to the polarity of the prods in use. This instrument permits the operator to obtain the correct reading of each cell in the battery under load conditions.





A Trunk for Your Outboard Motor

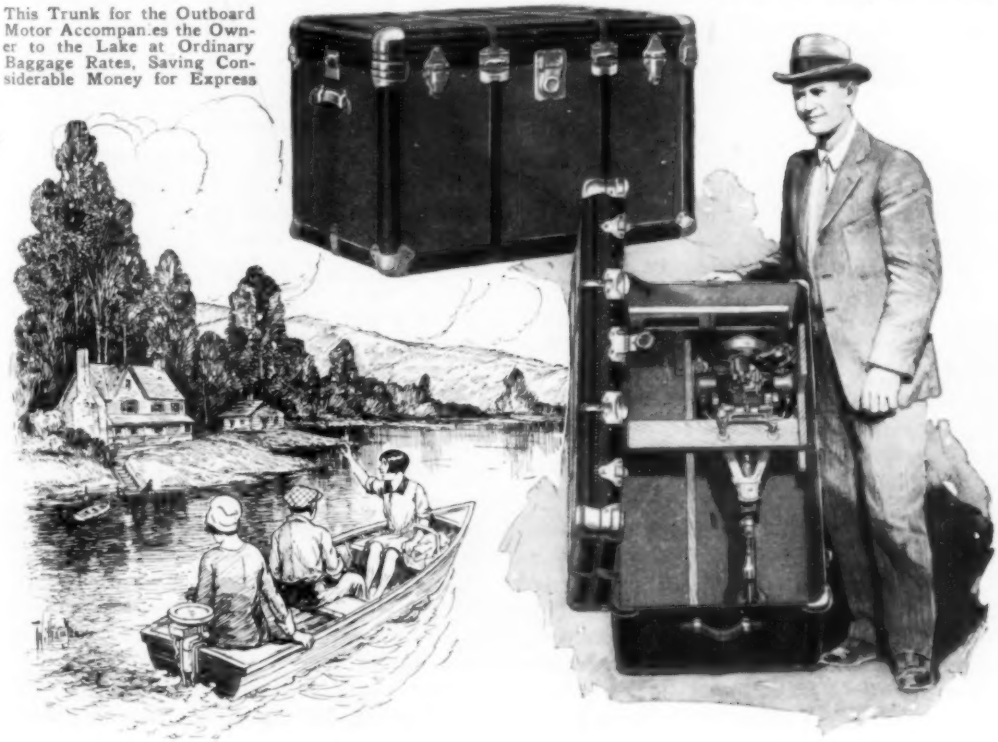
By JOHN EDWIN HOAG

ONE of the greatest advantages of the outboard motor for lovers of water sports is its portability. This advantage, however, is lost to those who travel to water locations on trains, because they have no suitable container in which the motor can be shipped as baggage. Railroad regulations prohibit acceptance of parcels other than trunks, or handbags, as personal baggage and these must be in good order and sufficiently substantial to withstand the rough handling. Thus, for the lack of proper containers, most outboard motors have to go by express.

After paying out a lot of money, the writer decided to solve the container problem once and for all. The result is the trunk shown in the accompanying photographs. The trunk itself is a good substantial one of the "dress" model, of sufficient length to take the outboard motor.

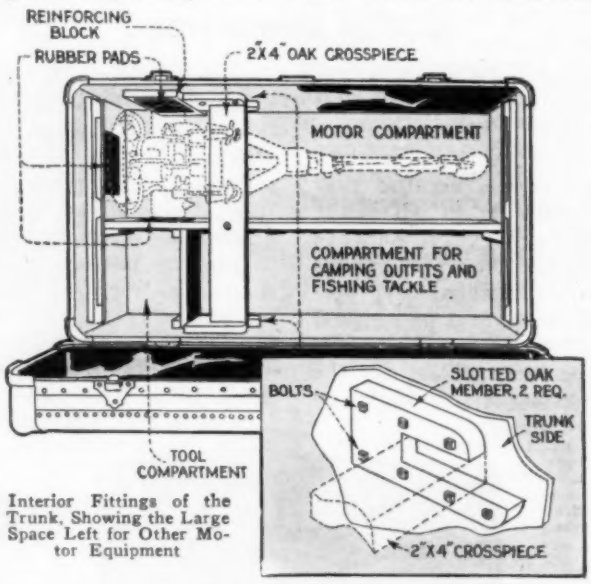
Into the bottom of this trunk I built the assembly of oak partitions and blocking shown in the illustrations. The motor fits into this without removing any part other than the steering handle. Moreover, it is held absolutely immovable. It is supported against rubber pads at the

This Trunk for the Outboard Motor Accompanies the Owner to the Lake at Ordinary Baggage Rates, Saving Considerable Money for Express



ends of the cylinders and the top of the flywheel. It is also held by the screw clamps by which the motor is ordinarily attached to the stern of the boat, and by a slotted oak block that holds the end of the propeller shaft.

The crosspiece to which the screw clamps are secured is of 2 by 4-in. wood. The ends of this fit into slotted members at the two sides of the trunk so that the member is removable. With this arrangement, packing and unpacking of the motor are easy. In packing it is only necessary to nest the motor into position. The cross member is slipped into place and the motor clamps screwed down upon it; the motor is then immovable no matter how roughly the trunk is handled. In removing it from the trunk, the screw clamps are loosened, the cross member released and the motor lifted out. After that, it is about half a minute's job with a screwdriver to replace the steering handle, and the motor is ready to be put into service.



Interior Fittings of the Trunk, Showing the Large Space Left for Other Motor Equipment

To gain additional strength, and provide convenient packing places for tools and other equipment, an oak partition is built down the length of the trunk. Thus, all motor duffel, and most of an ordinary camping outfit, fishing tackle, etc., can be packed in the bottom of the trunk. The regular trunk till is then available for clothing and lighter articles.

The advantage of this trunk arrangement over anything commercially marketed is the fact that the motor is carried as a unit virtually ready to use. It is not necessary to pack it in a half-dismantled condition, and the arrangement provides a method of packing that complies with all requirements of railroad or steamship baggage regulations. It also affords space for tools, clothing, gasoline and oil containers, and all the usual equipment that every out-board-motor owner needs.

It should be mentioned that all wooden fittings for this assembly are made of clear, straight-grained oak, and are secured to the main walls of the trunk with round-head brass bolts, put in from the outside, then riveted over the nuts and soldered on the inside. The cost for wood and hardware, exclusive of the trunk itself, and labor, was about $6. But this cost will be more than repaid by avoiding the usual express charges on the very first trip afield. Another great advantage is that everything needed for the motor is at hand at all times, and that all equipment can be kept under lock and key at the camp; this is sometimes very desirable. The time to equip your trunk is right now, so as to have it ready for the first summer trip.

Extension Grips for Door Handles

The inside door handles on Ford closed cars, models 1919 to 1923, project through the top of the door just inside of the glass. There is so little room between the handles and the glass that it is difficult to grasp them quickly, and finger marks are made on the glass. A pair of extensions for use on the spark and throttle levers can be attached to the handles on such cars, as they are of the same size and shape as the throttle lever and will furnish a much better grip. The extensions are clamped with setscrews and usually remain tight on the handle. A piece of heavy cloth may be coated with liquid glue and dropped over the handle with the ends hanging down.

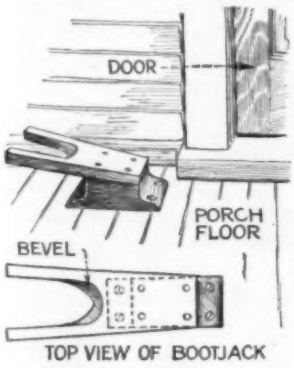
When the extension is pressed down over this and the screws tightened, it will be firmly held. The handles of later models are shaped differently and do not lend themselves to this improvement.

Why Varnish Blisters Outdoors

Outdoor varnished surfaces frequently blister. This is due to the treatment of the wood before the varnish is applied. Amateurs employ shellac for almost everything and this substance has been used to seal the grain of many doors and other fittings outdoors. However, shellac applied to such purposes is fatal to the permanence of a job. The reason is that heat of any kind will raise the shellac, causing blisters. Oil and other substances can be used to seal the grain just as well as shellac, so there is no reason for taking any chances with it.

A Bootjack for Overshoes

Did you ever stand out on a cold porch, trying to force a rubber off one foot with the toe of the other foot? I often did and that is why I made the bootjack shown in the drawing, and fixed it so I could fasten it on our porch every winter, when needed. There is not much to its construction, and it helps you to get into the house quickly.—T. H. Duffy, Juniata, Pa.



Carrier for Storage Batteries

For garage and service-station use, an old pair of ice tongs makes a handy tool for lifting and carrying storage batteries. To fit in the fingerholes of the battery case, it may be necessary to grind down the ends of the hook slightly and round them off. Wrapping them with tape will also help in sustaining the grip and prevent marring of the surface of the battery.

Novel Lamp Shade

As a decided novelty in the line of lamp shades we cut parchment to the proper

Novel Lamp Shade Made of Parchment and Ornamented with Signatures

size, then ornamented it with the signatures of friends. When the shade was completely covered with names, it was mounted in a frame and two coats of spar shellac were applied to give it a finished appearance. After this had dried, the edges were bound with tape and the shade was complete.—James Clark McGuire, Jr., Albany, N. Y.

Keeping Floorboards Tight

Rattling floorboards in an automobile are very annoying. It is, however, an easy matter to remedy this. Remove the rear right-hand bolt from the top of the gear case, and substitute a stud long enough to project about ½ in. above the floor. Seat the stud and then screw a nut down over it. This will act as a lock and hold the gear-case cover down tightly. A hole is then drilled in the floor to admit the head of the stud, and a large iron washer and wingnut are provided to keep the floorboards tight.

Western Orchestra Successfully Uses Old Auto Brake Drums for Chimes

Orchestra Chimes from Auto Drums

Have you noticed, when relining the brake bands on the rear wheels of your car, the clear, silvery tone the brake drum produces when you accidentally strike it with the hammer? A western orchestra leader uses the drums for playing beautiful chime solos and a number of obbligato accompaniments. So excellent are the results obtained that the orchestra has adopted them as permanent parts. Here is a valuable suggestion for amateur orchestras, which cannot afford to purchase a set of manufactured chimes. The brake drums on different automobiles vary in size and hence in pitch and tone.—L. W. Pedrose, Seattle, Wash.

Determining Amount of Water in Storage Battery

The storage battery of an automobile is likely to be the most neglected part of the car for it is usually tucked away in the least accessible place and the car owner forgets to add water to keep it in good condition. It is easy to construct and install a dash signal that will tell at a glance when it is time to refill the battery. Drill a small hole in one of the rubber vent caps and force a short lead strip through this aperture, allowing it to project downward until it dips into the electrolyte and almost touches the top of the separators. Remove the prepared vent cap and carefully fill any holes around the lead with hot sealing wax, being sure to leave one small pinhole through which gas may escape when the battery is charging. If your car has the negative terminal of the battery grounded to the frame, screw the cap with its lead electrode into the top of the cell nearest the positive end. Fasten with solder a length of well insulated copper wire to the exposed end of the electrode and extend it to a push button, mounted in any location convenient to the driver's hand, and then to a 6-volt 2-cp. lamp on the dash. As long as there is sufficient solution in the battery, this lamp will light when the button is pressed, but when the liquid drops too low the lamp will fail to respond. Some electric systems ground the positive wire, and this must be determined at the start, for, if your car is thus wired, it will be necessary to screw the prepared vent cap into the cover of the cell nearest the negative end.

"Dumb-Boy" Aids Riveting

Mechanics often need a helper to hold a heavy hammer under the surface of a plate which is being riveted. However, help is unnecessary if a "dumb-boy" of the kind shown in the drawing is used. It consists of a pivoted arm on a tripod, with a sledge hammer fastened to one end of the arm and a counterweight to the other. The hammer is adjustable and can be set at different angles and held there by means of a thumbscrew. Holes at the other end of the arm allow the counterweight to be hung at different points to vary the pressure of the hammer against the underside of the plate being riveted. Of course, the tripod is also made adjustable to various heights.

How to Make a Magnetic Maze Puzzle

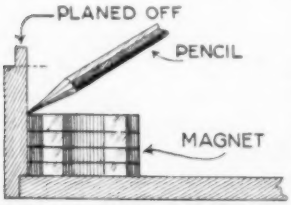
By H. F. GOODWIN

HERE is an easily made maze that is sure to interest the puzzle fan, as it is so arranged that the maze itself is invisible to the operator. It is simple in construction, can be made in a short time and involves practically no expense except for the magnets. The other materials needed are some cigar boxes, which any tobacco dealer will be glad to give you, three paper clips of the kind illustrated, some strong glue and a sheet of thin but tough cardboard. The four magnets needed should be of the horseshoe type, about 2 in. long, and can be bought in any five and ten-cent store.

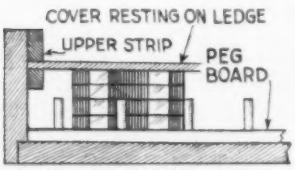
First remove the cover from a perfectly sound cigar box. The best box for this purpose is one having metal hinges on the cover and a flange running around the top over which the cover fits. After removing the cover, the flange should be planed off. Then take the bottom piece of another box, making sure that it is perfectly straight, and trim the edges so that it will fit snugly in the bottom of the first box. This forms the floor in which the pegs are inserted. Now take four magnets and glue them together so as to form one magnet of the required strength. In order to slide freely when the box is tilted the magnet is furnished with sliding feet. These are simply the heads of the brass paper clips, the prongs of which have been cut off with scissors, and are glued to the bottom of the magnet as illustrated.

An Easily Made Puzzle That Will Take a Lot of "Solving" and Provide Amusement for Hours at a Time

When the magnet is ready, place it on the floor of the box and move it around the inside edge of the box, marking its height with a pencil. This should be done very carefully. With the floor still in place, cut out thin strips of wood, which, when glued around the inside edge, will come exactly even with the pencil marks. This ledge forms the support for the cardboard cover. With the floor and ledge in place but not fastened permanently, take a pencil and dot the floor where the pegs are to be inserted, using the magnet as a guide. These dots should be placed in staggered rows, and it will be found, by a little practice, that they can be placed quite closely, as the inside edge of the magnet slides around and pivots on the pegs.



MARKING MAGNET HEIGHT



SECTION THROUGH PUZZLE

Take out the floor and insert the pegs, which should be only about one half the height of the magnet. Return the floor to the box and glue in the inside ledge. Now you are ready for the cardboard cover. This should be cut so that, when laid flat in the box, it is supported by the ledge. The cardboard is ruled off into checkerboard squares and has two squares on diagonal corners raised on small pieces of cardboard so as to allow the iron man or checker to slide underneath. These raised corners are decorated, respectively, with a diamond and a heart cut from old playing cards. A smaller diamond is glued on the face of the iron checker.

Before permanently fixing the cover to the box it is advisable to try out the puzzle. This can be done by placing the magnet in the box and, while holding the cover on with your fingers, tilting the box back and forth so as to see if the magnet slides freely, using the iron checker as an indicator. Though the magnet should be unhampered in its action, it is very important that the cardboard cover be laid directly on the magnet so that they touch. Now is the time to make any alterations that are necessary.

If everything is correct, put in the magnet and place the cover in position; then glue strips of wood around the inside edge. Have these strips even with the top and extend them down so as to almost, but not quite, touch the cardboard. This allows for a slight give to the cover so that the magnet will not be bound. If desired, you can use the hinges that came with the cigar box to make a hinged flap, as shown in the illustration. This permits the removal of the cardboard cover at any time.

The object of the puzzle is to move the checker from the space under the raised square marked with the diamond to that under the square marked with the heart by merely tilting the box. It will be apparent that the movement of the checker is controlled entirely by the concealed magnet which prevents the checker from sliding along any other path on the checkerboard than the magnet follows in the box. The magnet becomes hooked upon various pegs and the operator, being unable to see these posts or to know what is impeding the progress of the checker, will have great difficulty in bringing it into the desired space.

In tilting the box, one caution should be observed and that is not to jerk it too abruptly so as to cause the checker to leave the magnetic influence. If this does happen, the checker can be anchored again by simply letting it slide over the cover until it comes to rest over the magnet.

Quick-Acting Thumb Latch

An ordinary thumb latch usually fails to work if the door to which it is attached is quickly shut. This annoyance can easily be eliminated by attaching a safety pin to the door to form a downward-acting spring, as shown in the drawing. By this means the latch will be snapped down into its seat even though the door may be slammed shut violently.—Dexter W. Allis, Asbury Grove, Mass.

Protecting the Canoe for Ice Travel

Canoes on runners solve the transportation problem of northern Maine guides and settlers during the ice-breaking period

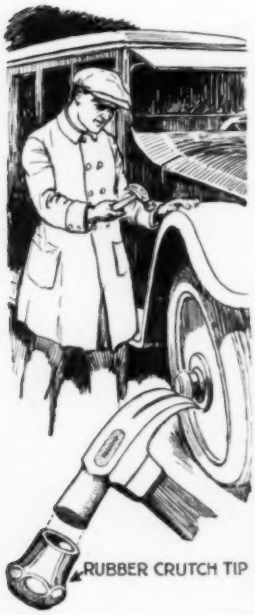
Strap-Iron Cradle Protects Canoes against Injury from Ice in Northern Streams, and Also Forms Runners Underneath Which Make It an Easy Task to Push the Canoes over the Ice

of spring. Without such an arrangement, it would be impossible for weeks to cross the large bodies of water at that season, which would seriously interfere with their food supply. The method of fitting a canoe for this service is to make a cradle of 2-in. strap iron into which the canoe fits. The cradle is securely fastened to the boat by means of clamps at both ends and a set of hangers, about 4 ft. from the ends. Three lengths of 2-in. strap iron, extending the entire length of the bottom, constitute the runners. When there are open stretches of water to be crossed, the cradle does not hamper handling the canoe with paddles. Upon reaching ice, the craft is run upon it. The iron cradle protects it from injury by the rough ice, and, acting as runners, makes it easy to push the canoe over the ice to the next stretch of open water. Using such an outfit, the woodsmen can transport a heavy load for a long distance with comparative ease.—Sam E. Connor, Auburn, Me.

Removing Ink Stains from Wood Floors

Ink stains can be removed from polished or bare wood surfaces in a few moments. For a polished or varnished surface, mix powdered pumicestone and linseed oil to a light, creamy mass, and rub the spots with a piece of felt or heavy-bodied cloth dipped in the mixture. Always rub with the grain and continue until all the ink disappears. On a bare wood floor apply repeated coatings of liquid oxalic acid with a brush. The liquid is made by dissolving a tablespoonful of oxalic-acid granules in 1 pt. of hot water and is used cold. This acid is poisonous only in large doses, but care is recommended nevertheless.—Francis W. Henry, Pottsville, Pa.

Hammer for Use on Polished Surfaces



It is impossible to hammer on a polished wooden or metal surface without making dents. An ordinary hammer will never do the work unless the head has been padded in a suitable manner. The kink shown in the drawing will be found satisfactory. Purchase a rubber crutch tip and force this over the head. Now you can do the work without any danger of marring the finish.

Improving the Pipe

Smokers will find that a pipe can be improved by drilling a small hole in the bowl, as shown in the accompanying illustration. The hole should be no larger than the diameter of a pin. Besides insuring a nice, cool smoke, this will also help the draw.—E. E. Burgess, Jr., Baltimore, Md.

Temporary Repair for Leaky Vacuum-Tank Float

Occasionally the float in the auto vacuum tank will spring a very small leak and load the float with gasoline. When this occurs far from a service station, it is considered a difficult repair job. One autoist, however, overcame the trouble in a novel way. The tank head was removed and the float and mechanism taken out. The float was placed on a hot stone and the leak located by the jet of vapor forced out. The opening was enlarged slightly so that the gas could be poured out. Then a soft match stick was carefully whittled to fit the hole and driven in until the hole was well sealed. A drop of water swelled the wood, and there was then no danger of its coming out. After the tank had been reassembled, the driver reached home without trouble and the repair lasted until a permanent job could be done several days later.—L. B. Robbins, Harwich, Mass.

How Amateurs Can Read Fast Code

Amateurs who cannot receive the code over telegraph sounders can take down fast messages accurately by using a strip of paper, about ½ in. wide, and a strip of carbon paper of the same width over it. The end of the paper is inserted between the bar in the sounder and the frame that it hits against. As the sounder goes up and down the paper is slowly pulled through it, and deciphered afterward. The dots and dashes will show plainly, as well as the spaces between words. If the paper is pulled through too fast or too slowly, it will be hard to read. With a little practice in pulling the paper through, any amateur can take down messages practically as accurately as an experienced operator, although, of course, he will have to take his time in deciphering them, at least to begin with.—Thos. F. Johnson, Cureo, Tex.

Soap Pencil Keeps Paint Off Panes

Numerous articles have been devised for the removal of paint from window panes, but prevention is better than cure, and by using the simple soap pencil shown in the illustration, it is an easy matter to prevent paint drops from sticking to the glass. Cut a bar of laundry soap to a wedge shape and use this to make a wide mark on the glass along the edge of the sash. With ordinary care, this will keep paint off the glass, and spots on the soaped part will come off when the soap is washed away after the paint is dry.—G. E. Hendrickson, Argyle, Wis.

How to Make a "Radio" Cigaret Box

By H. C. McKAY

THIS cigaret box is one which will be welcomed by the great army of radio fans. In appearance it is a small, one-dial receiver, but when the dial is turned in either direction, a cigaret is delivered at the top of the cabinet. The parts required are given in the material list on page 496.

The slopes and guards are first made. The slopes are set against the back panel, their upper ends ¼ in. from the top, and the lower ends 1 in. lower than the upper. A greater slope will allow the cigarets to bind against the sides of the lifts, preventing proper operation. The beveling of the edges of these pieces presents the greatest difficulty in making the box. This is rendered easier by first attaching the slopes to the guards, leaving square edges projecting. When the two are fastened together, the proper bevel may be provided by plane and sandpaper. These slopes are perfectly plain except for the bevels.

The guards are 3½ in. wide, 3⅝ in. high and made of ⅜-in. plywood. A central slot is cut in each, as shown. This slot is ⅜ in. wide; it starts ¾ in. from the bottom of the piece and is 2⅛ in. long. In the guard and slope assembly, all joints should be glued. They can be further strengthened by the use of 1-in. brads, set slightly below the surface. The inner slopes, with their guards, are set against the rear panel and secured to it by screws, making sure that these assemblies conform strictly to the outlines inscribed upon the rear panel before assembly.

The lifts are also made of ⅜-in. material and cut as shown. The central hole has upper and lower edges rounded, while the sides are square. The two long slots,

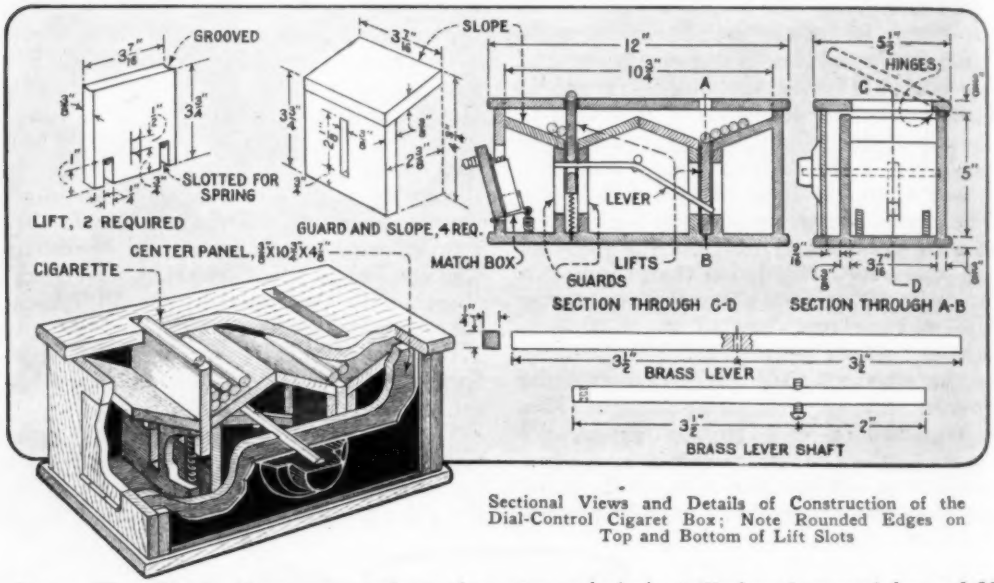
This Cigaret Box Should Please the Confirmed Radio Fan, Since It Looks Like a One-Control Receiver; Note the Suggested Headset Ash Receivers

cut near the edges, are for the springs. When the piece is completed, two screweyes, with a maximum outside diameter of ¼ in., are set in the upper ends of these slots. The lift is then set against the guards already placed, and two more screweyes set in the bottom of the box, in positions corresponding to the two in the slots. It will be noticed that the top of the lift is concave.

The springs used in assembly are 3/16 by ¾ in., of very light wire. Two springs are placed in each lift and attached to the screweyes already placed.

When the lifts are in place, the outer slopes with their guards are put in the same way as the inner ones. After this is done, the lift should be free to rise and fall with not more than 1/64 in. clearance on each side.

The assembly is now laid upon the workbench, back down, and a ¼-in. hole bored ¼ in. deep in the exact center of the back panel. A ¼-in. round brass rod is cut 5½ in. long. A hole is drilled 2 in. from one end and tapped for a 6-32 machine screw. A piece of square brass bar, ¼ by ¼ by 7 in., is bent in the center to form an angle of 165°. At the exact center, a hole is drilled and tapped for a 6-32 machine screw. A ½-in. 6-32 machine screw is set in this bar. The bar is then inserted through the lift and guards, at one side, and thrust far enough to allow the other end to be inserted in the lift and guards on the opposite side. It is then raised to the round bar, centered and the screw set into the bar. This is somewhat awkward, but a short screwdriver will facilitate the operation. Before proceeding farther, tilt the bar first to one side and then the other, to see if the lift drops to its lowest possible position when the bar is entirely depressed. When in this position, the top of the lift should be barely below the tops of the slope, so that a cigaret will roll into place. Then reverse the motion of the bar and see if the lift is raised from ¼ to ⅜ in. above the level of the top of the back panel. If so, the bar



Sectional Views and Details of Construction of the Dial-Control Cigaret Box; Note Rounded Edges on Top and Bottom of Lift Slots

MATERIAL LIST

1 top, 12 by 5½ by ¾ in.
2 ends, 5 by 5 by ⅜ in.
2 outer slopes, 2¾ by 3½ by ¾ in.
2 lifts, 3 7-16 by 3¾ by ⅜ in.
2 inner slopes, 2¾ by 3½ by ⅜ in.
1 guard, 3⅝ by 3½ by ⅜ in.
1 piece of brass, ¼ by ¼ by 7 in.
1 bottom, 12 by 5½ by ⅜ in.
1 back, 10¾ by 5 by ⅜ in.
1 center panel, 10¾ by 4⅞ by ⅜ in.
1 front panel, same size as back.
1 ¼-in. round brass shaft, 5½ in. long.
1 3-in. radio dial.
2 3-16-in. coil springs, ¾ in. over all.
Screws, stain, black enamel.

is O. K. The central panel has a ¼-in. hole in its exact center. It is set in place and screwed to the guards and slopes. Be very careful that no screw goes so near the edge that the wood is forced out against the lifts which would bind them and prevent proper action. Then the sides are put into place and screwed to the back panel, the bottom, the outer slopes and the center panel.

The top has two slots 7/16 in. wide and 3 9/16 in. long cut in it, to correspond exactly to the position of the lifts when they are raised. It is best to set the top in place temporarily, raise the lifts, draw a line around them to mark the position of the holes and then cut the slots with these marks as a guide. The top is then fastened to the box with a pair of hinges at the rear. Try the lifts and see if they rise and fall easily.

Stain and finish the box in any desired manner. The front panel has a ¼-in. hole bored in its exact center. It is given a coat of black paint and then a coat of black enamel. This is allowed to dry before the final assembly. When the whole box is thoroughly dry, the front panel is set in place and fastened. The ¼-in. round bar should extend from ½ to 5/8 in. from the front surface of this panel. A 3-in. radio-condenser dial is set upon this shaft and the box is complete.

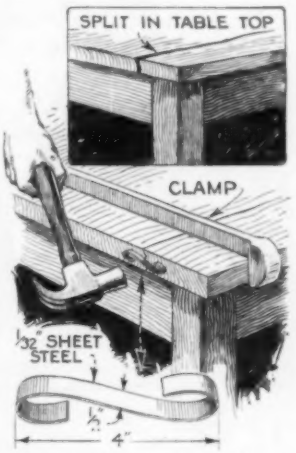
Place eight or ten cigarets in each side of the box. When the dial is turned slightly in either direction, one cigaret will be delivered at the top of the cabinet. If desired, a small door can be made in one end as indicated.

Rubber Cup on Shaving Brush

To prevent lather from running down one's arm when using a shaving brush, a rubber washer attached to the brush will be found to be convenient. The washer may be cut from a discarded inner tube and, when stretched over the ferrule of the brush, forms a cone-shaped cup, which catches the lather.

Repair for Split Table Top

Split table tops can easily be repaired by means of metal inserts driven into the edge as shown. The metal insert is a piece of thin sheet iron, bent to an S-shape. It is driven into the edge of the table after pulling the edges of the break together with a large carpenters' clamp. It is, of course, also a good idea to run some glue down into the crack before clamping.



Carrying Spare Valves

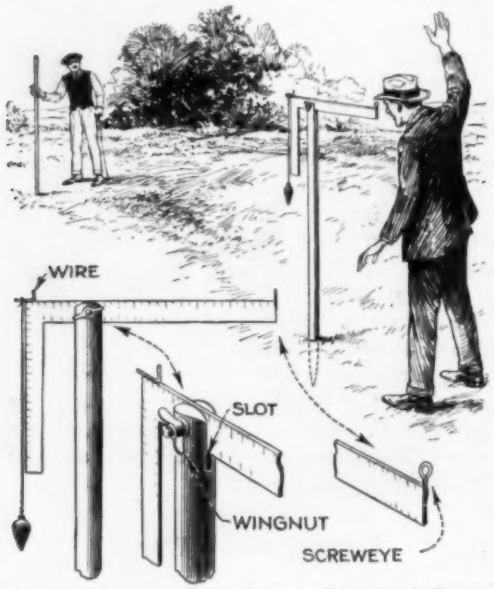
Often the motorist puts the small tin box containing extra valves under the seat in the tool box and later, when he needs a valve, finds the box has been crushed by the tools and the valves scattered and damaged. A good place to put valves in is the pump handle. Drill a hole in it, as shown in the illustration, and provide a cork, that fits the hole snugly.—G. A. Luers, Washington, D. C.

Electric Drill Used for Cleaning Automobile Bodies

Auto bodies finished with ordinary paint often become dull while the paint is still smooth and hard. A coat of varnish can be applied with good results without removing the paint in such cases. A rotary wire brush held in an electric drill makes a fast tool for cleaning and smoothing the surface. A brush of ordinary stiffness will not roughen the paint.

Improvised Level for Farm Use

In laying out portions of the farm, sighting for building foundations, laying



Improvised Level Made from a Carpenters' Square Proves Satisfactory for Farm Use

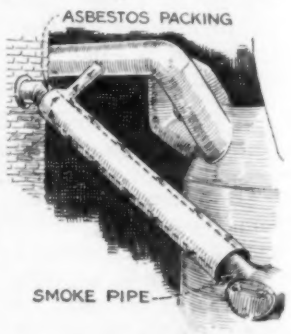
drain tile, etc., a surveying level is useful. An improvised one, which is easily and cheaply made from a carpenters' square, is shown in the illustration. Drill a hole in the long leg of the square, 5 or 6 in. from the corner. Choose a stake, about 6 ft. long, and saw a slot down in the center at the top and bolt the square in it as shown, using a wingnut to make it adjustable and providing some washers to take the wear. A short length of steel wire, bent at right angles, is soldered to the corner of the square so that one leg points vertically about 1 in. and the other extends horizontally the same distance. A small screweye is soldered to the front end of the square so that its center will be at the same height as the end of the vertical wire at the corner. Hang a plumb bob from the horizontal wire as indicated and arrange the cord just clear of the vertical edge of the square. To use the level, push the stake vertically into the ground and point the level toward the target, which is held by an assistant. Set the square in such a position by means of the wingnut that the cord holding the plumb bob will hang parallel to the vertical side of the square, which makes the horizontal side perfectly level. The target is raised so that it can be seen by sighting through the screweye in line with the vertical wire, like sighting a gun. A straight line from the horizontal edge of the level to the point sighted on the target will then also be perfectly level.—L. B. Robbins, Harwich, Mass.

Removing Iodine Stains and Grease Spots

Iodine is a stand-by in the home first-aid kit, but care is needed in its use, to avoid spilling it upon fabrics, on which it makes disfiguring stains. One of the simplest and best means of removing such stains from white goods is the following: Soak the cloth in clean limewater, which has been heated to the boiling point, a few minutes' immersion usually being sufficient whether the fabric is new or old, then rinse the cloth carefully in clear water before drying. Grease spots of animal or vegetable origin also may be removed by soaking in limewater, rinsing with clear water and finally washing the fabric with soap.

Simple Method of Conserving Heat

One can hardly realize how much heat is lost by radiation from several feet of furnace smoke pipe. Several years ago I found a method of utilizing this heat. A pipe, about 1 in. larger in diameter than the smoke pipe, was slipped over the latter as shown in the drawing. The lower end was left open to admit air while the upper end was closed by stuffing it with asbestos packing. A small pipe connects the upper end of the sleeve to a hot-air pipe. It is well to make a slip or telescope joint here so that the pipe can be removed for cleaning. The sleeve around the smokepipe should be well covered with asbestos paper.—W. O. Hendrickson, Argyle, Wis.



Preventing Squeaking Brakes

Nearly every autoist has suffered the annoyance of squeaking brakes. In most cases the work of relining the brakes can be traced to the owner's garage, or else to a garage employing inexperienced mechanics. In either case, noisy brakes could have been prevented by attention to one or two details. One is the setting of the copper rivets holding the lining. Projecting rivets scraping on the brake drums is the principal cause of squeaking and the preventive or cure is obviously to hammer down the rivets well below the surface of the lining. Of course, the proper tools must be used to do this without injuring the lining. The best rivets to use are the tubular type. Another cause of noisy brakes is a brake band bent out of true, so that the ends are drawn in against the drum before the main part of the band. Any lining near the end of the brake band is soon worn off and the metal ends scrape on the drums, which makes noise and wears down the drum. Care in relining, adjusting and equalizing the brakes at the time of renewal is well worth the effort in the saving of trouble, money and annoyance, not to mention the possibility of accidents which might result from the failure of the brakes.

Desk Drafting Board

It happens occasionally that the desk has to be used for drafting and the sliding leaf on one side can be adapted to this purpose as follows: Brass clips are screwed to the top of the leaf so that they will grip the paper securely when it is slipped under them. A small T-square can be made from a 12-in. rule, with a crosspiece screwed on, as indicated. This arrangement, of course, presupposes the use of the standard 8 by 10-in. office paper or some similar size.—Deane B. Caldwell, Cedar Rapids, Iowa.

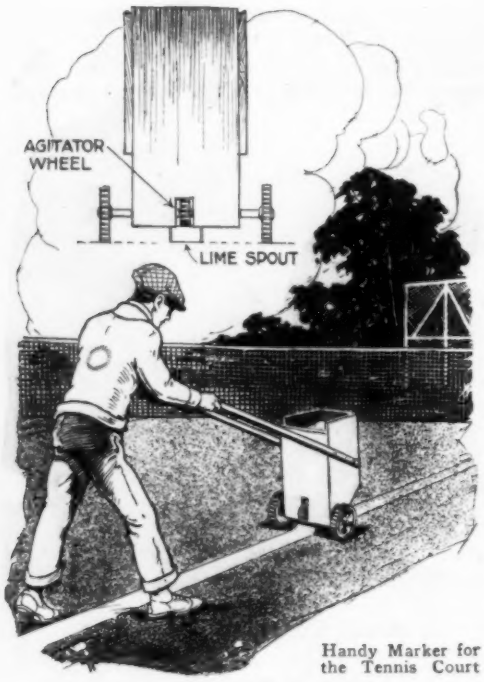
Sliding Leaf of Desk Used as Drawing Board with Brass Springs to Hold Paper

Novel Wren House Which Children Can Make as Advocated by School Superintendent

Small Bungalow for Wrens

Unlike most other birds, wrens like to live by themselves and a small house especially suitable for them is shown in the photo. It consists of a base upon which six cigar boxes are mounted, each having a small hole drilled or cut in one end, as indicated, to provide an entrance for the birds, and a wooden roof over which asphalt shingles are laid to add to its appearance. A miniature fence is made of colored wooden balls, drilled for nails, with which they are attached to the base. The balls are also drilled to receive lengths of light dowel rod for the horizontal members of the fence. The roof is tied to the corner posts with heavy twine and an ornamental flag is fastened to the peak.

¶To make a storm door from a screened one, tack a strip of roofing paper over the screen.



Handy Marker for the Tennis Court

Improvised Tennis Marker

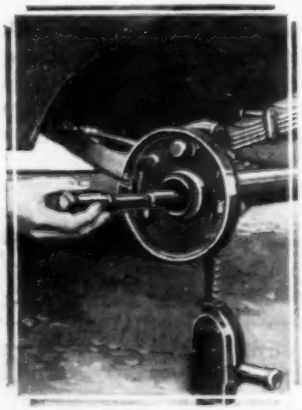
An efficient tennis marker can be made from materials that may be found in the junk pile of almost any garage. The one shown in the illustration was made from an oblong box, with a small shaft for an axle, to which were keyed three timer gears, two large ones for wheels and a smaller one to act as an agitator for the marking material. The small wheel rotates in a groove in the bottom of the box and its gear segments feed the lime out of a tin spout the width of the line to be marked. This device overcomes the greatest difficulty of the sifter type of marker in that it can be filled in a short time.—Maurice E. Miller, Addison, N. Y.

Chain Used as Bottle Cleaner

Cleaning bottles seems to be one of the bugbears of housework. An excellent method is to use a small chain. Tie a string to one end of the chain and then drop the chain in and hold onto the string from the outside. Pour a little water or other cleaning liquid in the bottle, close the opening and shake well. The chain will scrape around and remove all the sediment. This method will thoroughly clean milk and vinegar bottles, kerosene reservoirs on oil stoves and the like.

Stopping Rear-Wheel Grease Leaks

When Ford rear wheels leak grease, it usually indicates that there is an excessive amount of lubricant in the differential housing and this should first be determined before attempts are made to stop the leak. If the grease is thin and gritty it should be removed and, in order to do this, it is necessary to draw it out with a grease gun having a long spout, as there are no provisions for draining the differential. The grease should be kept to the level of the filler plug, but if it still continues to leak at the wheels, new felt washers should be put in. The wheel is removed and the outer axle-shaft roller bearing hooked out with a piece of stiff wire. The washers may be jammed far into the axle housing with a long screwdriver or rod, and the bearings replaced together with the customary outer felts. In replacing these, it is a good plan to lubricate them with cup grease, as this prevents friction, which otherwise might destroy them very quickly. However, new washers will not always stop bad leaks. If so, leather washers cut to fit the axle shaft should be used in addition and sometimes will be found quite effective. In some cases a long piece of heavy wire, twisted around the axle, will stop the leak. It acts like a screw in forcing the grease back into the differential. Probably the most effective method of ending this annoyance is that of drilling a ¼-in. hole in the bottom of the axle housing, near the innermost end of the outer axle-shaft roller bearing. This admits air into the housing, causing a back pressure, and thus effectively stops the leak.



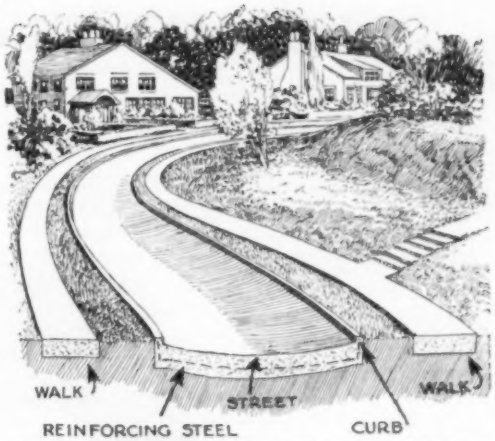
Flowers Preserved with Celluloid

The curator of the Academy of Science in Lincoln Park, Chicago, recently hit upon a scheme that is worthy of attention of all who are interested in preserving flowers. He discovered that a coat of liquid celluloid, or collodion, over the mounted specimen will give it just the protection desired. The solution is poured into a shallow pan, and the mounted specimen is immersed in this until the celluloid has settled on the plant and card. It is then withdrawn from the bath and hung up to dry. A clip of any sort can be used to attach the card to a string. Put a plate or piece of paper beneath to catch the drippings. The use of the liquid celluloid in many cases has been found to restore faded colors and bring out their original freshness. The coat of celluloid protects the plant from dust and moisture and, in case the card gets soiled, it can be sponged off without harm to the plant. If the collodion gets too thick due to evaporation, add a little ether, which can be purchased at a druggist's.—H. H. Slawson, Chicago.

Handy Clothespin Holder

Paper bags for carrying purchases, provided by exhibitors at fairs and by many storekeepers, can be made into clothespin holders by simply cutting an oval hole in each side, as shown in the illustration. The bags themselves are too deep for this use, but when openings are made as suggested, 4 to 6 in. from the bottom, the hand is easily inserted to pick a pin. The type of bag referred to is that fitted with string handles. By using a hook bent to an S-shape the holder can be suspended from the line and slipped along it with ease.

Paper Bag with an Oval Hole Cut in Each Side Makes a Handy Clothespin Holder



Streets in a Western City, Designed to Carry Off Storm Water, Save Cost of Storm Sewers

Street Design Saves Storm-Sewer Cost

One western city, exposed to heavy rainfalls of comparatively short duration, but where snow is unknown, has found that, in many cases, it can save the cost of storm-sewer installation by building the street pavements with concave surfaces instead of convex, as shown in the illustration. This doubles the area available for carrying flood run-off without requiring the construction of high curbs at the sides. Because of the short duration of the rainfall the streets are never impassable for more than an hour at a time. The pavements are built on grades steep enough to prevent the deposition of sand and silt. Steel reinforcing should be placed in the concrete near the center of the slab and should be bent upward at the edges so as to tie the curbs to the roadway.

¶One more car noise can be eliminated by cutting a piece from an old inner tube and fastening it behind the lock holding a spare tire.

Make a Hammered-Copper Plaque

By E. R. HAAN

IF you are artistically inclined and would like to do some work in hammered copper with figures in bold relief, as illustrated in this article, go to a hardware store and get a few ordinary nail sets, at a cost of 10 cents each, an 8-oz. and 13-oz. ball-peen hammer and some pieces of No. 18 gauge sheet copper, having these pieces cut to the size of the plaques. Be sure that the surface of the copper is not scratched or marred as this will ruin the work.

First get a picture or design from a newspaper or magazine, or, if you can draw satisfactorily, make it yourself. Trace the design on the surface of the copper by using typists' carbon paper. Go over the weak carbon lines with a soft lead pencil to bring them out clearly. Hold the lower jaw of a wood clamp in a bench vise securely, and bring the upper jaw of the clamp down over the design, to protect it while the background is being forced down about ¼ in. from the edge of the design. In doing this, the work has to be shifted a number of times in the clamp, and care must be taken to strike only the background at this stage of the job. A wooden punch and a hammer are used to do this, as shown in Fig. 1, while a short piece of dowel rod will allow you to get into recesses of the background, as shown in Fig. 2. The piece of copper will be distorted considerably, but the design will stand up roughly in relief. Lay the plaque, face up, on a double thickness of corrugated cardboard obtained from an old box, and you will be able to improve the rough outline with the dowel punch and hammer, as shown in Fig. 3. The reverse side of the plaque is shown in Fig. 4.

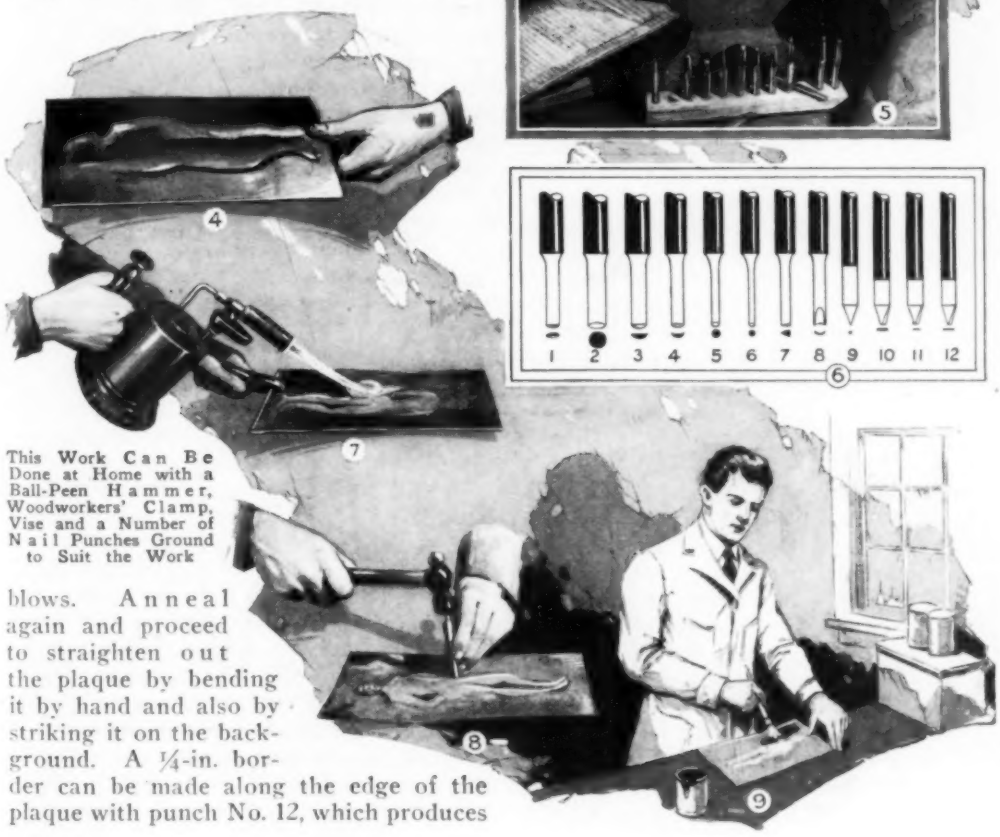
Hammered-Copper Work Is an Interesting Hobby and Copper Plaques in Bold Relief Appeal to Those Who Are Artistically Inclined

The next step is one of the most important in the whole process—that of annealing the copper. By pounding and stretching the plaque, the copper becomes very hard and brittle, which makes it extremely difficult to work, and if the work is continued while the copper is hard, it may be cracked. To overcome this, the plaque is heated to a cherry red and immersed in water. This makes it so soft again that it can readily be bent and hammered. The heating can be done by holding the plaque

over a gas flame, over a coal fire, or by applying the flame of a blowtorch, as shown in Fig. 7.

Laying the plaque, face down, on a double thickness of corrugated cardboard, shape the design by using wooden punches and a hammer, the faces of the punches being slightly rounded to prevent sharp dents in the design, where these are not wanted. Now use the ball-peen hammer on the background, as shown in Fig. 5. This hammering is done on an anvil or heavy piece of steel and, after the background is hammered, the plaque is again annealed. The nail sets are ground down, as shown in Fig. 6, and the ends are polished to remove the grinding scratches; if this is not done they will show up on the copper. Take punch No. 5 and, starting about ⅛ in. from the design, punch the background down, until you have come to the very edge of the design, as shown in Fig. 8. Here it is necessary to be careful, as the design can easily be spoiled by a few misdirected blows. Anneal again and proceed to straighten out the plaque by bending it by hand and also by striking it on the background. A ¼-in. border can be made along the edge of the plaque with punch No. 12, which produces a straight line, about ¼ in. long. Give the finishing touches to the shape of the design from the reverse side of the plaque on corrugated cardboard as before.

Get 15 cents' worth of liver of sulphur from the drug store and crush the pieces to powder form, dilute them in water, and apply this solution to the background with a brush, as shown in Fig. 9. The copper will turn black where the solution touches it, so be careful not to get it on the design. Get some fine jewelers' polishing cloth and proceed to polish the figure. If available, use a buffing wheel for a finishing polish, and also buff the black coloring from the high spots of the background. Then apply transparent lacquer.



This Work Can Be Done at Home with a Ball-Peen Hammer, Woodworkers' Clamp, Vise and a Number of Nail Punches Ground to Suit the Work

Handy Inner-Tube Clamp

When repairing inner tubes on the road, a clamp of the kind shown in the drawing will be found convenient. It consists of a base of 1-in. wood and a length of ¾-in. strap iron, bent to a U-shape to fit snugly around three sides of the wooden base. The ends of the iron clamp are drilled and it is then attached to pivot on one end of the base, as indicated. In use, the tube is placed on the base, with the place to be patched in the center, and the clamp is then brought down to hold the tube securely while it is patched.—Vincent J. McMurtry, Chicago.

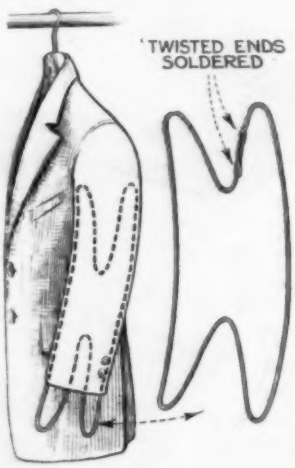
An Underwater Flashlight

When something is dropped into a dark cistern or a shallow well, or when for any other reason it becomes necessary to make a search in dark water, place a pocket flashlight in a fruit jar and screw down the cover, with a new rubber ring in place, to make sure that it is watertight. The lens of the light should point toward the bottom of the jar and the jar must be weighted so that it will sink. Bind waxed cord securely around the neck of the jar to hold it. The wax will prevent the cord from slipping. An interesting use of the underwater flashlight can be made at night from a boat, if the water is smooth or if a "water telescope" is available. If the water is fairly clear, fish below the jar can be seen or the bottom can be examined if the water is not too deep. A water telescope is simply an open tube without a top and with a piece of glass fastened in the bottom. Its purpose is to provide an undisturbed surface without reflections through which to gaze. The user thrusts the closed end into the water. Looking through it, he can see objects at great distances under the surface. Fishermen in the West Indies use the water telescope, and the glass-bottomed boats of the Bermudas and Santa Catalina are built on the same principle.—Edwin Tarrisse, Washington, D. C.

How to Break In a Pipe

To break in a new pipe, remove the stem and make a plug of soft wood to replace it. Then fill the bowl with hot—not boiling—water. Let it stand for one or two minutes and repeat the operation half a dozen times. The last time leave the water in the bowl overnight. Wipe it dry the next morning, replace the stem, and the pipe is ready to give you an enjoyable smoke.—H. Z. Sanders, Tulsa, Okla.

Keeping Crease in Coat Sleeves



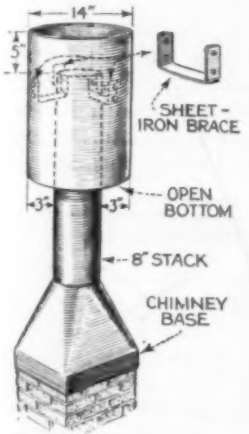
When coats or dresses are suspended from hangers for any length of time, the body of the garment may preserve its shape, but the sleeves soon become wrinkled and lose their creases. To insure the neat appearance of the entire garment, it is only necessary to insert one of the spring devices shown into each sleeve. These springs are made from heavy wire.

bent to fit inside the sleeves so as to stretch them a trifle, as indicated, the ends being twisted and soldered together at a point where the joint will not touch the fabric.—G. E. Hendrickson, Argyle, Wis.

Safety-Razor Blade Kink

New safety-razor blades sometimes have a tendency to "pull." Many blades are discarded for this reason that would otherwise be made to give good service. The blades are sometimes honed slightly more on one side, which causes a deflection of the edge, curling it somewhat the opposite way. By turning the blade over the objection will be overcome, and this may be done several times before renewing the blade.—Charles E. Forgette, Plattsburg, N. Y.

Forcing Draft through Chimney



Chimney draft can be forced by the addition of a cylinder on the end of the chimney. There should be an open space of 3 or 4 in. between the chimney and the cylinder. Iron strips bent to the shape shown in the detail are riveted on and hold the cylinder in position securely. The cylinder should project about 5 in. above the chimney. This arrangement will work equally well no matter from which direction the wind blows.

Emergency Stain Remover

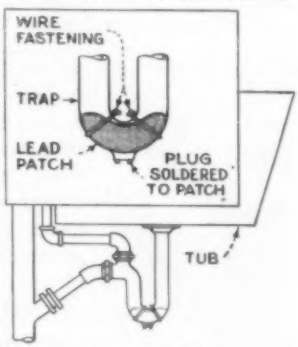
When working about the car in good clothes, to make some minor adjustment on the engine, you may get a grease spot on your sleeve. The soap compounds used by mechanics for washing grease off their hands, and which are usually kept around the garage, can be used to remove the stains. It is applied by means of a moist cloth and then washed off.

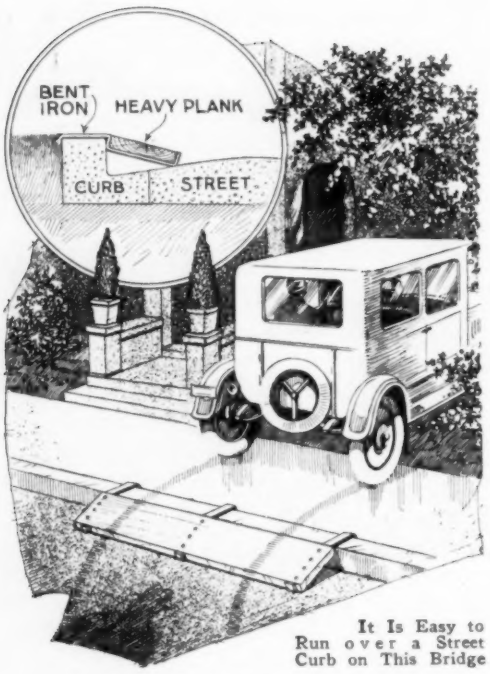
Leather Stop Holds Bed in Place

Pull-out beds of the kind shown in the drawing sometimes have the tendency to slide a few inches out of place, owing to slight irregularities in the floor surface. Various kinds of hooks and latches could be used to hold the bed in place, but these would be too conspicuous, so the problem was solved by placing a small leather stop in front of each caster. The stops were made from pieces of old sole leather obtained from a neighborhood cobbler. They were beveled at the ends and screwed down to the floor in front of the casters, as indicated. It is not difficult to pull and push the bed over these obstructions and they will prevent the bed from sliding out.

Simple Repair for Sink Trap

After pulling out the clean-out plug from the trap on the laundry tub accidentally, I made a neat and satisfactory repair as shown in the drawing. A sheet-lead patch was bent to conform to the curvature of the trap and a hole cut in the center into which the plug with its thimble was soldered. The patch was then lined with soft putty and pressed against the trap where it was securely held by two heavy wires twisted around the pipe. This emergency repair served its purpose well. —Frank Small, Toronto, Can.





It Is Easy to Run over a Street Curb on This Bridge

Curb Bridge for the Driveway

This curb bridge is equally good for temporary or permanent use as an approach to a private driveway. Three supports, made of ⅜-in. flat iron, are bent to form hooks, as indicated in the cross-section view. They are placed at the ends and center of a 2-in. plank of suitable length. Bolts are used to fasten the hooks to the plank and the bridge is hooked over the curb as shown.—Lester P. Young, Culver, Ind.

Repair for Leaky Water Pipe

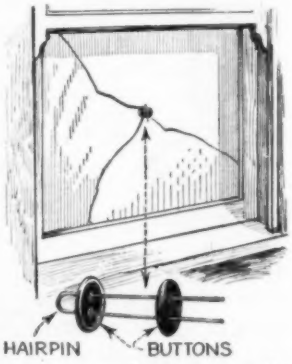
One morning upon waking we found the bathroom floor flooded with water and soon discovered that this was due to a leaky pipe. An emergency repair had to be made at once, so I got a small screw and a rubber washer, placed these in the leak, as shown, and ran a length of soft wire around the pipe, and through the groove in the screwhead, twisting the ends together with a pair of pliers. This drew the screwhead and washer up against the leak firmly and stopped it effectively until a more permanent repair could be made.—C. M. Wilcox, Torrington, Conn.

Matching New Wood with Old

When a new piece of wood is to be set into old wood, which often happens in repair work, it is a simple matter to match the two in color. If the new piece is too dark, bleach it by applying a solution (used when cold) of one large tablespoonful of oxalic-acid granules in 1 pt. of hot water with a brush, until it is the same as the old. If it is lighter, give it one or more coats of liquid ammonia, until it matches. Then stain, fill and varnish the surface in the usual way.—Francis W. Henry, Pottsville, Pa.

Buttons and Hairpin Mend Broken Glass Panes

When a window pane is broken so that it needs a support in the center to keep the pieces from dropping out, the method shown in the illustration will be found serviceable. Two buttons and a hairpin are used. The hairpin is slipped through two holes of the first button, through the crack or hole, and then through the second button on the other side of the glass. Then the two ends of the hairpin are grasped with a pair of pliers and drawn up and twisted until tight. The raised rims on the front of the buttons should bear against the glass.—Dr. Halliburton, Moberly, Mo.



Tips for Sewing-Machine Users

If the top thread used in a sewing machine is wiry and hard, the loop through which the shuttle passes will not form correctly and this will result in skipped or missed stitches. This fault can be corrected by applying whale or sperm oil to

the thread. Moisten a small piece of sponge and attach it to the machine so that the thread will absorb oil as it rubs over the sponge.

Here are three ways to remove the needle when it is stuck or held fast in the needle bar: One is to remove all the threads and run the machine at high speed; the second, to take out the needle screw, put a needle with the point broken off in the screw hole and pry or force the tight needle out of the bar, and the third is to tap or hit the needle bar gently with a piece of wood.

To prevent the shuttle or bobbin thread from spilling or coming out of position, use a soft-finish thread underneath, especially on high-speed work or when long rows are to be sewed. If new needles are tight in the bar and have to be forced up, the needle hole can be made larger by grinding a needle flat at the top of the shank, leaving a fine burr. Move the needle up and down in the hole and the burr will scrape sufficient metal away to enable new needles to be inserted very easily. The take-up spring tension should never exceed that of the top-thread tension when a correct lockstitch is desired. —J. D. Calvert, London, Can.

Plate Safeguards Elevator Door

After an elevator operator had his fingers caught and injured in the sliding collapsible gate, a safety guard was fastened under the handle as shown in the illustration. It consists of a piece of 1/16-in. sheet metal attached to the edge of the door securely by the same screws that hold the handle on. This will not interfere with the operation of the door in any way. The edges are carefully filed down to make a neat job and avoid injury from them.—Frank Harazim, New York City.

Ordinary Farm Pump Converted into a Sanitary Drinking Fountain

Sanitary Drinking Fountain on the Pump

It is an easy matter to install a sanitary drinking fountain on an ordinary pump. Drill and tap a ½-in. hole in the top of the spout and get a 2-ft. length of ½-in. copper tubing. Clean the tubing thoroughly and then thread one end so that it can be screwed into the tapped hole. Bend the tubing carefully so that it passes back to the pump, where it is wired on securely. Then the other end is bent up vertically, as indicated. A wooden plug is made to fit the spout snugly and is tied to the pump with a length of chain or rope. In use, the spout is plugged, causing the water to rise in the tubing when one pumps. The pressure on the handle determines the height of the stream.—L. B. Robbins, Harwich, Massachusetts.

A Substitute Tie Clasp

An ordinary paper clip will serve as an efficient tie clasp, as shown in the photo. If you have facilities for providing a plating bath, the clip may be gold or silverplated, thereby improving its appearance considerably.—K. B. Murray, Sturgis, Mich.

Tumbling Clown Agitated by Air Current Caught in Funnel Forms Novel Weather Vane

Wind-Driven Tumbling Clown

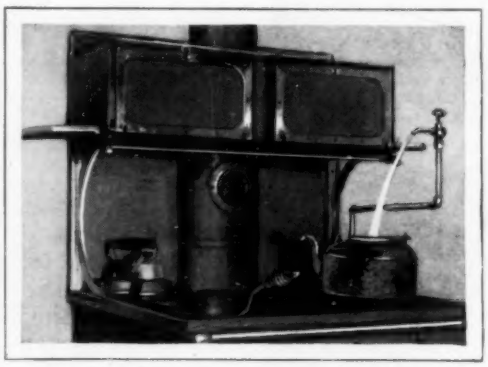
Quite a novel departure in weather vanes is shown in the drawing. The device consists of a length of 1 by 4-in. wood for a base, a piece of sheet metal cut and painted to represent a circus tent, a small turbine wheel with a figure of a clown attached, and a funnel. A hole is drilled in the center of the base so that it can swing readily on a vertical shaft attached to the top of a post or building. A flange is provided on the shaft to support the vane. The sheet-metal circus tent is attached to one end of the base and the clown and funnel at the other end so that the base will be perfectly balanced when set on the shaft. The turbine is made by tacking a number of tin blades to an ordinary wooden spool and the figure of the clown, which is also cut from sheet metal, is soldered to the edge of these blades. The turbine is mounted on a short wooden post which is high enough to allow the clown to rotate without touching the base. A strip of tin is attached to the turbine post and is bent to form a windshield on the lower part of the turbine to prevent it from turning in the wrong direction. The funnel is attached in a similar way so that it directs the air on the blades of the turbine just above the windshield and causes the clown to turn back somersaults rapidly.—Lester P. Young, Culver, Ind.

Removing "Frozen" Clincher Tire

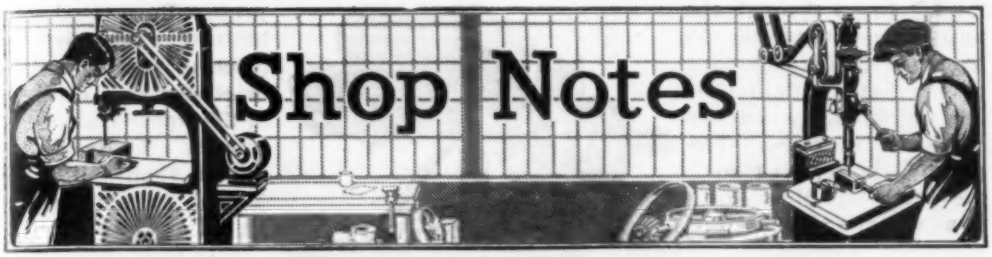
It frequently happens that the bead of a clincher tire becomes firmly stuck in the rim due to rust. Place the deflated tire and rim or wheel under the middle of the front axle, mount the jack on the tire, close to the bead, and jack the car up. If necessary, do this at 6-in. intervals around the tire on each side. Before using the rim again apply soapstone powder liberally to prevent future trouble.—J. W. McFarlane, Toronto, Can.

Hot-Water Coil in Range

The faucet shown in the photo is connected to the hot-water coil in the range so that warm water is available immediately after the fire has been started. This feature is of special value when the hot-water tank is upstairs and the water must run through a long pipe to reach the kitchen sink. Another advantage is that large containers, such as wash boilers and tea kettles, can easily be filled since it is only necessary to slide the empty boiler under the faucet. By this means the customary practice of carrying many pails of water from the kitchen sink to the stove is eliminated.



Connecting a Water Faucet to Water Coil in Stove Gives Hot Water at Once



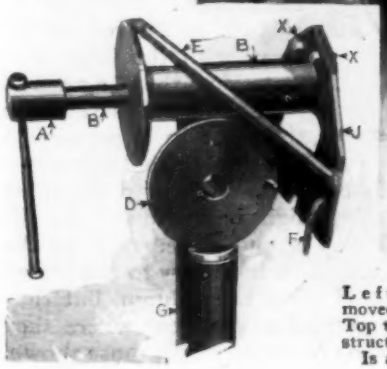
All Shop Notes published in 1926, in book form—Fifty Cents—from our Book Department

A Universal Engine-Overhaul Stand

By RAY F. KUNS

A STAND which is practically universal in movement can readily be made up from a few pieces of pipe, some plates and a little round stock. It is designed to handle the Ford engine when it is removed for overhaul. It will cut the time for this operation very materially, as well as add to the satisfaction of working by providing a convenient piece of equipment.

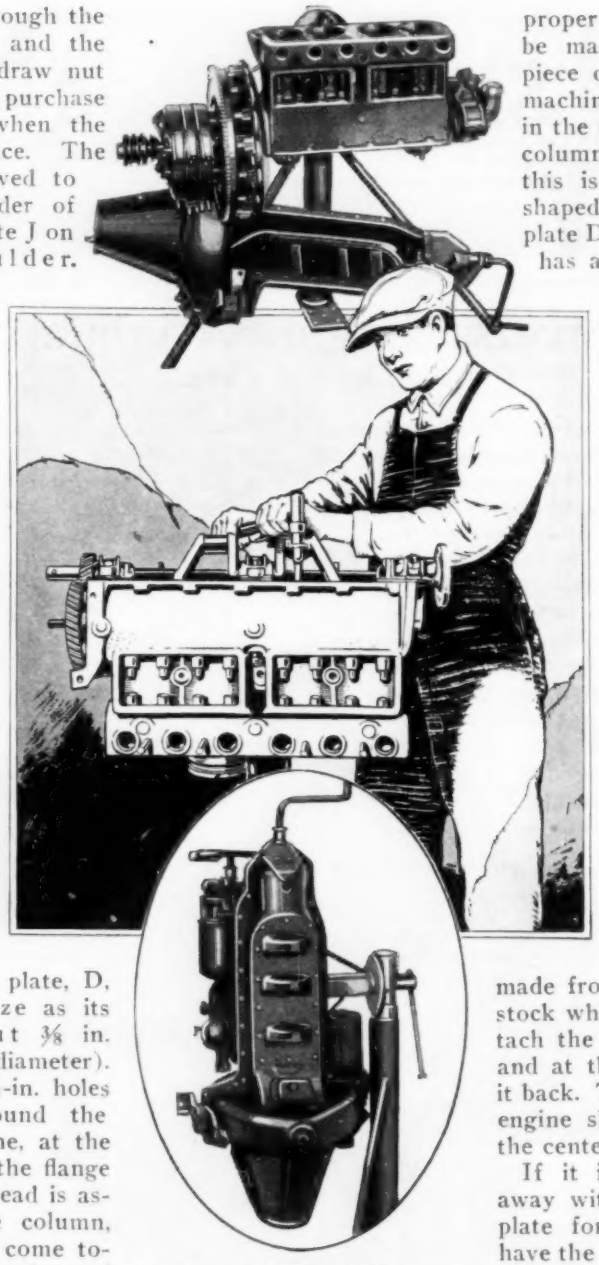
The device is designed to grip the engine on the left-hand side. The plate J is made up to fit the cylinder block and crankcase casting. Two capscrews, marked X, are used to bolt the plate to the water-manifold boss on the cylinder block. Two lugs, F, are welded to the lower edge of the formed plate so that they will correspond to two of the crankcase-to-cylinder-block bolt holes, which are removed before placing the plate in position for mounting the engine on the stand. When constructing the stand, this plate should be worked out first and fitted to a Ford block. The heavy spindle, B, is shouldered down to fit into a 1-in. hole drilled through plate J. Countersunk-head screws are then run through the plate into the shoulder of the spindle, to anchor the parts together. The end of the spindle, passing through the plate, may be riveted over to add to the strength.



Left, Arm Removed and Set on Top to Show Construction; Plate C Is at the Left

The inner end of B also is turned down to 1 in. and has threads chased on it. The length of this shoulder is 4 in., which al-

lows it to go through the post or column and the handle with its draw nut to have ample purchase for tightening when the engine is in place. The plate C is screwed to the inner shoulder of B, as was the plate J on the outer shoulder. Two ¾-in. round-steel braces, E, are run from plate to plate as shown, to form braces and take the strain of the engine weight. They serve this purpose no matter in what position the engine is placed. The main part of B is 9¼ in. long between shoulders, so that it throws the engine out 10 in. —far enough to clear the post and braces with the starter in place.



Two Views of the Stand in Use, Showing How the Engine May Be Swung

The flange or plate, D, is the same size as its mate C (about ⅜ in. thick by 8 in. in diameter). A number of ½-in. holes are drilled around the flange C and one, at the same radius, in the flange D. When the head is assembled on the column, the two flanges come together and are clamped tight by the screw threads of the draw nut when turned by the handle. A pin through the holes in the flanges holds the head rigid.

The column G is made from a piece of 3-in. pipe, but an old axle housing would do just as well. The center of the head should be 32½ in. from the floor, and proper allowance should be made for this. A piece of round steel is machined to a drive fit in the upper end of the column. One side of this is then milled or shaped to receive the plate D. The other side has a spot milled flat to receive the draw nut. This piece is then secured in the top of the column by means of rivets or dowels.

This stand was made with a plate for a base, in order to allow it to be moved to any point of the shop. The base is 5/16 by 24 by 48 in. The braces, H, are welded to the base plate and to the column. It will also be noted that the column has a base support made from a piece of flat stock which is used to attach the post to the base and at the same time set it back. The weight of the engine should come over the center of the base.

If it is desired to do away with the large iron plate for the base and have the device screwed to the floor in a permanent position, the old axle housing would be ideal. Half of a discarded Ford housing might be found and the differential-housing end bolted right to the floor. It might be necessary to run braces similar to H from the column, but they could be carried to the rear where they would be less in the way than those shown.

In the stand shown, the base was made from the plate in order that no difficulty be experienced in running the floor crane, with an engine swinging in it, right up to the head for mounting. Thus the objection of a heavy base support is overcome.

As suggested above, the Ford engine may be swung to any position in this stand without removing any of the accessories, and can be disassembled to the last bolt leaving only the block. Bearings may be taken up or refitted and the engine then built up again, and, after the work is done, it is lifted, complete, from the stand and dropped into the car frame.

Good Pipe Joints from Lead Wool

Everyone does not possess a lead furnace for making pipe joints, but even without this, a good job can be done. Lead wool, which looks like fine excelsior, can be had at plumbing-supply houses and can be rolled into a most convenient strand for ordinary calking purposes. This material has been found to be very efficient in stopping leaks under cellar floors, where the house-service piping comes through the concrete, and the calking can be done with a hammer and ordinary tools. In using this material, no heating or melting of the lead is necessary.—L. H. Georger, Buffalo, N. Y.

Feed Rack on Wagon Saves Time

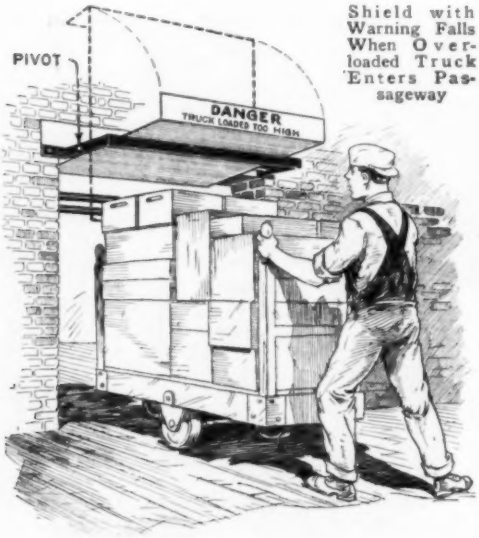
The feed rack shown in the photo is mounted on a wagon and is readily detachable. It is filled directly from the stack or mow and is driven to the yard, where the cattle can feed from it. At the base, on either side, is a feed box for grain, which serves also to catch loose hay. It was found that the stock can get at the hay on this rack much more easily than from a stationary rack built on the ground.—George B. Harrison, Council Bluffs, Iowa.

Movable Feed Rack Which Saves Time and Has Been Found Convenient on the Farm

Semicircular Shield Keeps Heat around Frozen Pipe and Hastens Thawing

Thawing Out Frozen Water Pipes

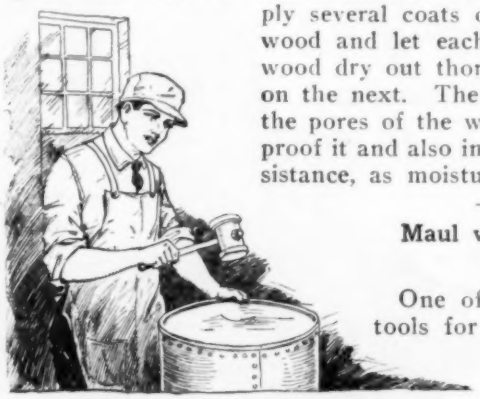
When a blowtorch is used to thaw out frozen water pipes much of the heat is wasted, as only a small portion of the flame strikes the pipe. By using a shield of the kind shown in the drawing, which tends to confine all the heat of the flame around the pipe, the work can be done much more quickly. The shield is made from a piece of galvanized sheet iron bent to a semicircular shape and provided with a wooden handle, which enables the user to hold it in any position. The wooden handle is attached by means of small angle brackets as securely as possible, to prevent it from coming loose when the shield gets hot. A better way would be to fasten a 6-in. length of ½ or ¾-in. pipe to the shield in the same manner and then insert a wooden handle into the opening of the pipe at the other end. —Jesse L. Blickenstaff, North Manchester, Ind.

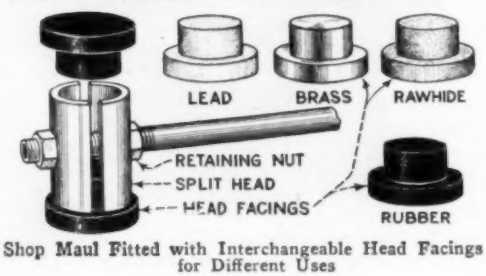


Shield with Warning Falls When Overloaded Truck Enters Passageway

Drop Signal for Overloaded Trucks

While passages in factories or warehouses, leading from one department to another for transferring materials on hand trucks, usually are sufficiently high to clear an ordinary load, occasionally someone overloads a truck and jams it in the opening, causing the topmost portion of the load to be pushed off. To avoid such occurrences, one factory uses an effective signal, which warns a truckman at once if his load is too high to clear the steam pipes running across the top of the passage. It consists of a strap-iron bracket bolted above the doorway and a sheet of metal pivoted in the bracket by two pins so that, when raised against the wall, its lower edge is level with, or a little below the lowermost steam pipe. The top is bent at right angles and the warning is painted on this part. If a truck is loaded too high, the load catches the metal sheet, causing it to fall with a loud crash on the bracket and at the same time exposes the danger sign.





Shop Maul Fitted with Interchangeable Head Facings for Different Uses

Drying Printed Matter Quickly

Merchants in all branches employ mimeographing machines for advertising purposes. These machines print through a typed stencil and the ink feed may be regulated so that the printing is light or heavy. In most instances, however, the operator, desiring clearness of print, forces the feed so that the printed sheets falling into the receiving tray become more or less smudged from contact with one another. To prevent this, a Wisconsin merchant has a slow-speed electric fan directing a draft of air against the pile of printed sheets as they drop into the basket. This causes a cushion of air to be retained between the sheets, which prevents smudging. The printed matter is then ready for folding almost immediately.

To Make Wood Fireproof

Fairly open-grained wood that is to be used in heated locations and in electrical machines can be fireproofed in the following way: Dissolve waterglass in warm water and allow the solution to cool. Apply several coats of the solution to the wood and let each one harden and the wood dry out thoroughly before putting on the next. The waterglass penetrates the pores of the wood and this will fireproof it and also increase its electrical resistance, as moisture cannot enter.

Maul with Interchangeable Head Facings

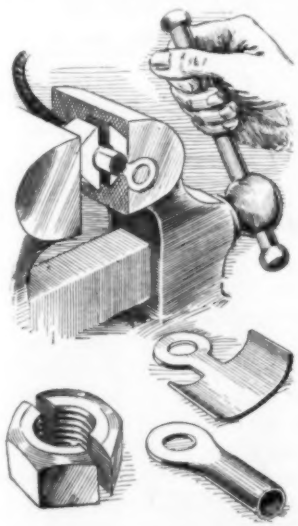
One of the most serviceable tools for mechanics is a maul having interchangeable head facings. It consists of a tubular head, split lengthwise, and a small pipe handle held by two nuts, as shown. The facings are made of brass, lead, rawhide and rubber and held by tightening the nuts.

Reversing Auto Quickly

How to shift gears into reverse when the car is moving forward is a kink worth knowing in preparation for an emergency, when it is not only necessary to stop but also to move backward immediately. This was the means of preventing accidents on several occasions on a mountain road near Denver, Colo. To shift into reverse when the car is moving forward is to invite disaster to the gears, but the same effect as stopping the car can be obtained by jamming the brakes tight enough to lock the wheels before shifting. Then, unless the clutch is still spinning, a quiet shift is possible and the car can be reversed, when it stops so quickly that an otherwise unavoidable collision is averted. A driver making daily mountain trips with a tourist car on narrow roads mastered this trick in preparation for meeting a fast downward bound car, which is sometimes unable to stop in a short distance.

Crimping Electric Wire Terminals

When crimping the shell-type wire terminals around electric cables, the method shown in the illustration has been found entirely satisfactory. An ordinary nut, preferably one having coarse threads, is split. It is placed about the terminal, gripped in the vise and pressure brought on it with the vise jaws. Some years ago, in a shop where the writer was employed, we made up special crimping dies to do this work at a cost of approximately $30 each. Split nuts would have saved practically all of this cost.—G. A. Luers, Washington, D. C.



¶Wire mesh is useful for drawer bottoms in tool cases where dirt may accumulate.

Mail Box Held on Extended Arms of Figure Made and Painted to Resemble Uncle Sam

Uncle Sam Mail Box

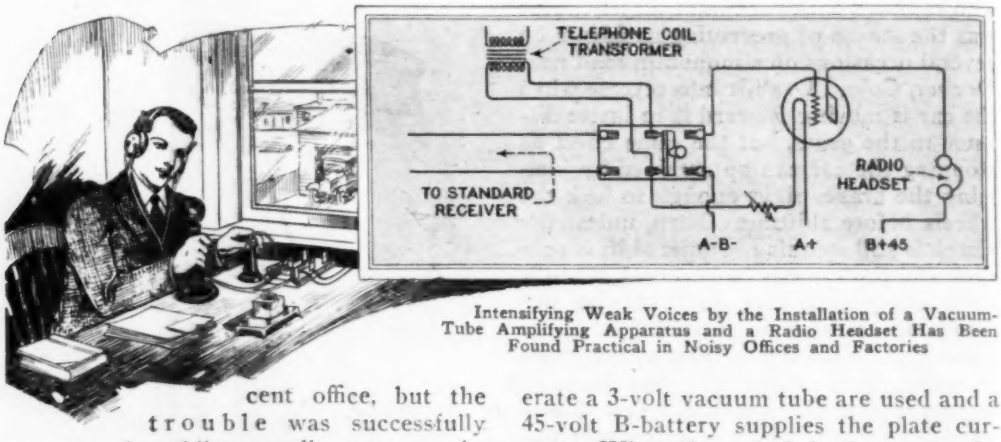
Instead of the customary post with the mail box attached, one farmer cut out a figure of a man and painted it to resemble Uncle Sam. The arms extend horizontally to hold the mail box, which is fastened to them by means of small angle brackets. The figure is mounted on a 2-in. plank, which serves as a base, with heavier brackets. As an additional support, a ½-in. iron rod is attached to the body and to a short post level with the ground.—C. F. Hollingshead, Reading, Mich.

Paint Mixed with Drill Press

An excellent method of thoroughly mixing paint, shellac, etc., is to place the can under a high-speed drill press. A propeller, made by locking an oblong flat piece of metal between two nuts on a small rod, is clamped in the chuck of the drill press. The flat ends are given a slight twist to give them the shape of propeller blades. White-lead paint mixed in this way is almost as smooth as enamel.

Telephone Amplifier Overcomes Noise in Shop

The noise of machinery often made it difficult to use the telephone in an adjacent office, but the trouble was successfully overcome by adding a radio vacuum tube and a headset, as shown in the drawing. To install them, disconnect the receiver cord from the transformer in the base of the telephone box and run wires from the disconnected terminals to the knife terminals on a double-pole double-throw switch. Connect one pair of end terminals of the switch to the standard telephone receiver and the other pair to the amplifying circuit. A rheostat is inserted in the filament line and a headset in the output circuit. These connections are shown in the diagram. Dry cells to operate a 3-volt vacuum tube are used and a 45-volt B-battery supplies the plate current. When the switch is thrown to the left it connects with the telephone receiver in the usual way, but when it becomes necessary to have more power, the switch is thrown to the right and even weak voices will be amplified considerably. By the use of a double headset all noises from the shop machinery will be shut out.—R. F. Starzl, LeMars, Iowa.



Intensifying Weak Voices by the Installation of a Vacuum-Tube Amplifying Apparatus and a Radio Headset Has Been Found Practical in Noisy Offices and Factories

Cover Protects Small Magnifier

The photo shows a simple method of protecting a small magnifying glass. Get an old snuff box, or similar container, and cut a small notch in the side for the handle. Then fill the box with soft cloth of the kind used to clean the glass. The cover fits down firmly over the lens and protects it against breakage and scratching.

Tin Cover for the Magnifying Glass Is Made from Old Snuff Box

Acid-Proof Wooden Sinks

When wooden sinks are used in factories, laboratories, etc., it is often desirable to make them water and acid-proof. Common paints soon peel off and even commercial roofing paint, thinned with gasoline, will not last long. An excellent method of attaining this end is the following: First dry the wood by scraping and heating it until all the moisture is driven out. Heat some pure block asphalt in a suitable receptacle and, when well softened, add raw linseed oil in the proportions of 8 oz. of oil to 1 gal. of the melted asphalt. Stir thoroughly, then pour the paint into the sink and spread as rapidly as possible with a stiff brush. It dries so quickly that only a small space

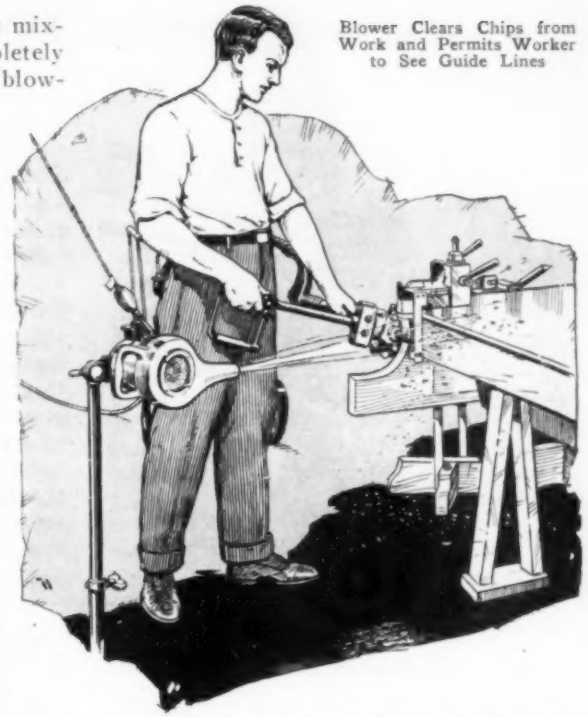
can be covered at a time before the mixture sets. When the sink is completely covered you should take a plumbers' blowtorch and play the flame on the asphalt until it sinks into the wood and melts down to a fairly smooth surface. Keep the flame moving back and forth so that the wood will not be overheated.—L. B. Robbins, Harwich, Mass.

Wet Cloth Strip Prevents Burning of Pie Crust

In making pies, especially pumpkin pie, which has to be baked longer than others, the housewife often finds that the rim of the crust is overbaked or burnt. To avoid this, cut or tear a strip of clean cloth, about 1½ in. wide and long enough to encircle the pie. Just before placing the pie in the oven, dip this strip in water and cover the rim of the crust, allowing part of the strip to hang over the edge. The additional moisture retards the baking of the rim enough to prevent it from becoming too crisp, or burning. After the pie has been taken from the oven, the strip can readily be removed.—Mrs. M. R. Wells, Cleveland, Ohio.

Substitute for Corkscrew

Photographers, whose chemicals come in bottles with wide mouths and flat corks, which have a tendency to go in too far or may even be forced into the bottle, will find the kink shown in the drawing a practical preventive of this trouble. By pushing a nail through the cork from the bottom side, a good handhold is provided. The stopper will remain air-tight owing to the resiliency of the cork.—E. E. Zahm, Glendale, California.



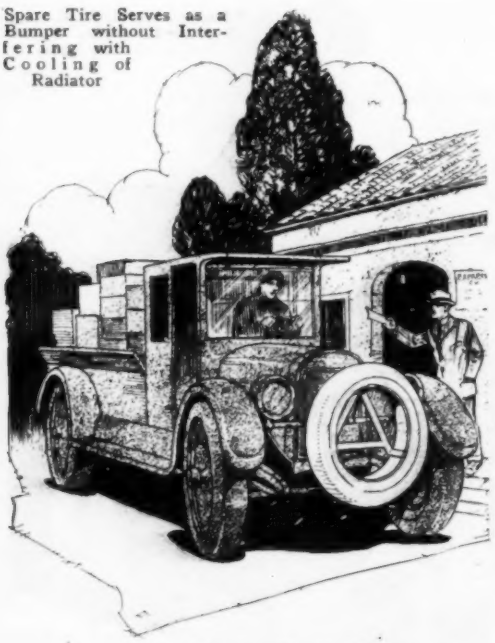
Blower Clears Chips from Work and Permits Worker to See Guide Lines

Blower Clears Chips from Woodwork

On many operations with woodworking tools, it is difficult to follow layout lines, due to the accumulation of chips or sawdust on the work. One piano-manufacturing concern overcomes this trouble in a very simple way, by mounting a portable blower near the work, and directing the blast so as to blow away the chips. The illustration shows how the blower is used during the operation of cutting the radius on a grand-piano end frame.

Improved Cement Mixer Lasts Longer

Because of the gritty nature of sand and cement, concrete-mixing machines are short-lived. This is especially true of bearings supporting the shaft that passes through the mixer. A contractor of the middle west has improved his mixers by adding to the end of each a pipe screwed into the bearing inside of the oil-cup hole and connecting this pipe to a 2-gal. water tank supported about 12 in. above the bearing. This gives sufficient pressure to make the water flow slowly through the bearing into the mixer, thus washing the cement and sand from the surfaces.



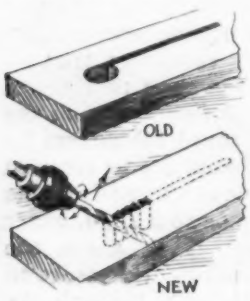
Spare Tire Serves as a Bumper without Interfering with Cooling of Radiator

Spare Tire Forms Front Bumper

On many trucks there is no suitable place to mount the spare tire, so one truck owner attached it in front of the radiator, as shown. The framework is made by fastening pieces of heavy flat iron to the tie-rod between the headlights and to the part of the chassis below the radiator, the ends of the frame being bent at right angles. Mounted in this position, the tire will not interfere with the cooling and it also acts as a bumper.—Dale R. Van Horn, Walton, Nebr.

How to Start a Keyhole Saw

Instead of boring one large hole to start a keyhole saw, drill about five or six ⅛-in. holes in line, as close together as possible, then run the drill through them at an angle. While turning the drill, lift it slowly to the vertical position, and you will have a neat slot all ready to start the saw and not even a bad corner.—John A. Blaker, West Auburn, Mass.

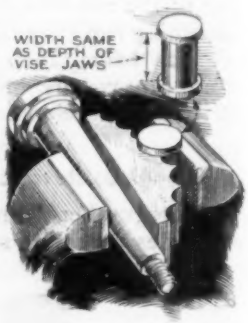


Discarded Films and Phonograph Records for Pipe Joints

A man who owns a plumbing and pipe-fitting business has found that gaskets made from discarded films are useful in flange and union couplings on hot and cold-water lines. He claims the results obtained are just as good as if sheet rubber were used and the cost is nothing. In trying them on steam lines where the flange faces had been finished on a planer, he found the results fairly good, but, if the least bit of roughness existed on the faces, the joint usually would leak. In another case a 10-in. phonograph record was used as a gasket between two flanges on a 3-in. hot-water pipe line, a hole being cut in the center of the record. The joint was perfectly tight with 125-lb. pressure on the line and remained tight for several years.

Holding Tapered Parts in Vise

Where irregular or tapered parts are to be held in the vise, the adjustable block shown in the illustration will be found a valuable aid. It is made up as a triangle, with the two shorter sides scalloped or recessed for the spool holder. The spool is flanged so that the block will not slip vertically. The clamping face of the block will seek the taper on the work. The recesses or scallops allow the spool to be set so that the block will distribute the grip of the vise jaws evenly along the work.



Marble Slab for Surface Plate

I find that a discarded marble top, so often found on old furniture, makes an ideal surface plate, as they are heavy and usually ground to a true surface. I use one for this purpose and also a large piece of another for a saw table. It is easy to work and the saw slot can be cut with an old saw, keeping it wet with water while doing this.—H. E. Van Buren, Rapid City, S. Dak.

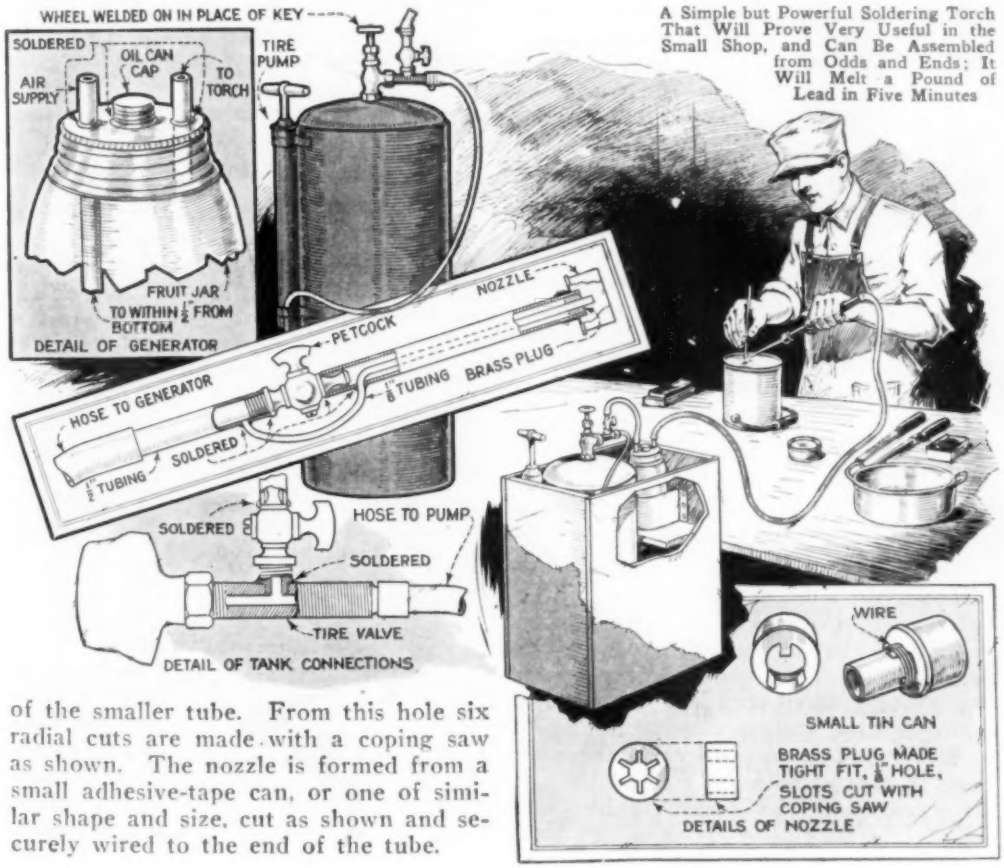
A Powerful Gasoline Torch

By FLOYD MOORE

THE torch shown in the accompanying drawings can be made in a short time from few materials, and will prove very convenient in the small shop. It provides plenty of heat for all ordinary soldering operations, and will melt a pound of lead in five minutes.

First build the torch, using ½-in. tubing and a ½-in. petcock for the main body. The torch is about 10 in. long, over all, the shorter nipple, nearest the generator, being 3 in. long, and the one at the torch end about 6 in. A piece of ⅛-in. brass or copper tubing is fitted to the ½-in. one, in the manner shown in the drawing, soldering all joints perfectly, and a brass plug made for the outer end of the torch. This plug is from 3/16 to ¼ in. wide, a tight fit in the end of the tubing, and has a ⅛-in. hole drilled in the center to take the end of the smaller tube. From this hole six radial cuts are made with a coping saw as shown. The nozzle is formed from a small adhesive-tape can, or one of similar shape and size, cut as shown and securely wired to the end of the tube.

Now for the generator. Take a quart fruit jar, remove the cap and drill three holes across the top. The center hole is covered by a screw cap, cut from an old oilcan. In one of the two outer holes is soldered a piece of ½-in. tubing, 2 in. long, 1 in. extending above the top of the cap, and in the other hole, a similar tube, but extending to within about ½ in. of the bottom of the jar. Use a new rubber on the jar, and screw the cap down tight, after filling the jar with gasoline to a point just below the shorter tube. The tank used with this outfit was an old Prestolite tank, but any similar tank will do. Remove the old hose connection on the tank and replace it with a tire-valve stem, soldered in. This can be done without altering the tank in any way. The valve stem has a hole drilled midway on one side.



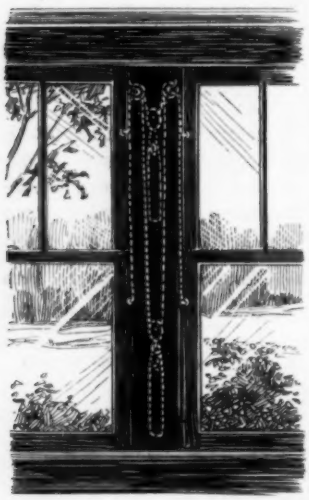
A Simple but Powerful Soldering Torch That Will Prove Very Useful in the Small Shop, and Can Be Assembled from Odds and Ends; It Will Melt a Pound of Lead in Five Minutes

over which is soldered a petcock with a short piece of tubing on top, as shown. The hose leading to the generator goes on here, and the hose to the torch leads from the short tube of the generator. The petcock on the side of the valve stem must be turned off when more air is to be pumped into the tank. The air pressure is furnished by a tire pump, attached to the valve stem.

To light the torch, open the torch petcock, and then the air valve and cock on the tank. The air goes down the long tube into the generator, and, bubbling up through the gasoline, carries the vapor to the torch. It can be ignited with a match.

One Window Weight Used for Two

Instead of using four 5 or 6-lb. weights between windows I get two 9-lb. weights,



and hang them as shown in the illustration. Each sash cord must be cut twice as long as it is for the old method and the weight is attached to a small awning pulley by means of a length of wire passed through the eye of the pulley. This runs on a sash cord fastened to both windows and passes over the pulleys in the casing, as indicated. The advantage of this method is that it eliminates the possibility of tangled cords. —G. F. Sutton, Sedalia, Mo.

Cause of Flickering Headlights

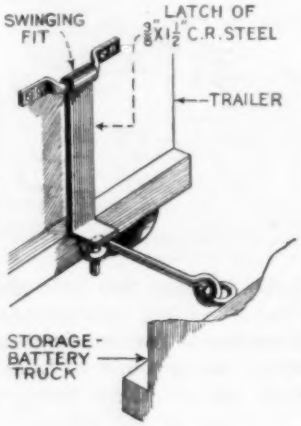
Flickering headlights are sometimes caused by loose connections in the socket at the junction block, the switch or, occasionally, by a bare wire coming in contact with the metal frame of the car. One auto owner, who experienced this trouble, discovered that a headlight wire, which passed between the hood and the frame, had become bared, and had shorted the entire lighting system, causing the lights to flicker and go out whenever the wire came in contact with the frame. On another occasion the same trouble was traced to a bare tail-light wire. If both the headlights flicker and go out, it is a fairly sure indication that the trouble is caused by a short. If only one flickers, a loose connection usually is responsible.

How to Arrange Countershaft for Two Speeds

It is sometimes an advantage, in a shop where very little screw cutting is done on the lathe, to have the countershaft arranged for two speeds. This is done by placing a large pulley on the line shaft and not crossing the belt. Of course, in this case the lathe cannot be reversed. This method has been used in a shop for years and found quite an advantage. By using the cone pulleys and back gears, twelve cutting speeds may be obtained.

Simple Shop-Trailer Latch

Trouble with shop trailers unhooking from the tractor can be eliminated by providing a latch to hang over the head of the hook as shown in the illustration. The latch is made from a length of flat iron or steel bent over to swing on a short length of rod, which is screwed to the body of the trailer. The lower end of the latch,



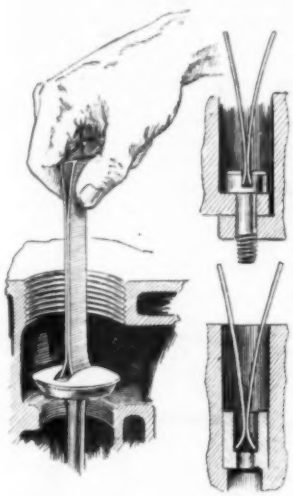
which is bent at right angles, fits over the head of the hook and prevents it from rising. When the trailer is detached, the latch is raised and the hook disengaged from the bolt. —Aug. Mathieu, Chicago.

Waterproofing Auto-Step Plates

Rubber step plates on auto running boards do not fit closely enough to keep mud and water from entering under them and causing rust, but by applying storage-battery sealing compound hot to the boards in a heavy layer and pressing the plates down into it, the rust is prevented. The compound must be soft when the plates are installed, to make a water-tight fit, and it is best to warm also the running board with a torch, to keep the compound liquid for some time. The step plates must be bolted to the running boards, as usual, to keep them in place.

Holder for Valves, Screw Bolts and Sleeves

When overhauling some truck motors, the mechanics used a device consisting of flat pieces of spring steel, with the ends slightly bent out, for lifting valves during the seating process. The use of the device is clearly shown in the illustration. After they are inserted in the slot of the valve, the ends in the hand are pressed together, which causes the lower ends to grip the valve securely. Slotted machine screws can be removed or replaced with the device, and even circular parts, such as sleeves and bearings, can be held quite firmly with it.

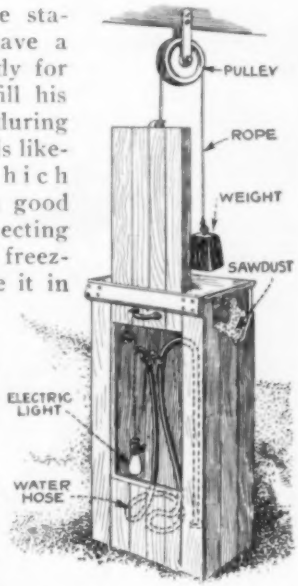


Defects in Leather Belts

Having considerable trouble with poor leather belts, which broke frequently, the following method of finding defects in a belt was found successful: Put the belt in a vinegar bath; this will bring up all defects, such as poor fibers, by swelling and darkening the leather.

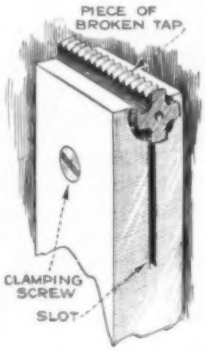
Device Keeps Water Hose from Freezing

Auto-service stations often have a water hose handy for the autoist to fill his radiator, and during winter the hose is likely to freeze, which may ruin it. A good method of protecting the hose from freezing is to inclose it in a double-walled box with sawdust packed between the two walls for insulation. Heat is provided inside by means of an electric lamp. A double-walled sliding door, equipped with a handle and a counterweight, allows the motorist to get at the hose inside. The box inclosing the hose is about 5 ft. high. —Mrs. R. L. Riggs, Fort Smith, Ark.



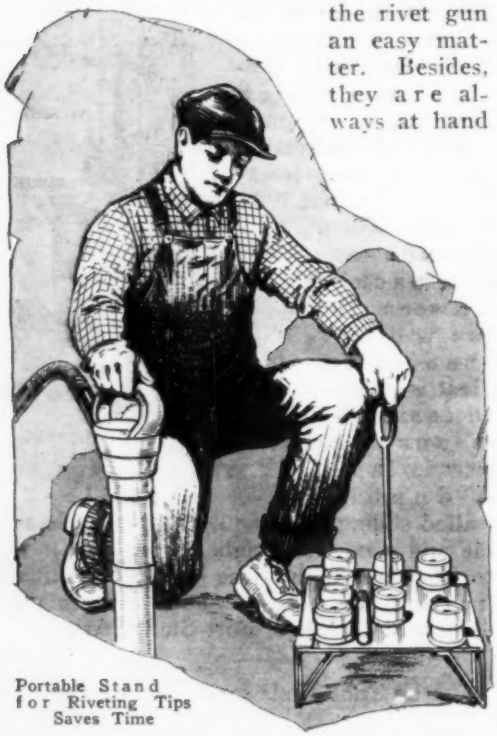
Lathe Tool Made from Broken Tap

One of the problems in most shops is the salvage of broken tools, among which a large number of taps are usually found. When a tap is so broken that an inch or more of the threaded portion is left, make a holder as shown in the drawing. Get a piece of bar machine steel, and drill the end, tap it out the same as the broken tap, and slot it an inch or so. Then saw off the end of the bar. Insert the piece of broken tap with one set of teeth outward and clamp it firmly with a screw, which is threaded in a hole also drilled through the bar as shown. This makes a good "chasing" tool, which will often be found useful in lathe work.—Donald B. Templeton, Lynbrook, N. Y.



Portable Stand Holds Riveter Tips

In a Denver steel shop the small, portable stand shown in the illustration makes the carrying of an assortment of tips for the rivet gun an easy matter. Besides, they are always at hand instead of lying about the floor of the shop, so that the right tip can be found at once. Four light legs, 6 in. long, are welded to the bottom of a ¼-in. metal plate, 12 in. square. In this twelve holes are drilled or punched to receive the tips. A small rod, with a hoop in the top end, is welded to the top of the plate to serve as a handle.—Jos. C. Coyle, Denver, Colo.



Portable Stand for Riveting Tips Saves Time

To Keep Windshield from Rattling

On Ford closed cars, of earlier date than 1924, the lower windshield frame is clamped by two knobs, which pass through slotted ears on the frame and into brackets on the body. When the clamps are tightened, the ends of the windshield frame are often spread apart as there is no bar across the top of the glass. This leaves the glass loose so that it will rattle. Washers should be slipped over the shaft of the clamping knob, nearly filling the space between the ear on the frame and the body bracket. This prevents pulling the frame out of shape when the clamps are tightened. If washers that are too thick are used, the windshield frame will not move easily when the clamps are loosened. If the washers can be turned easily with the fingers when the clamps are loose, their thickness is about right.

Method of Handling Wet Photos

Large prints, when wet, have a tendency to stick to the bottom of the tray and delay in picking them out may cause overdevelopment. If you are using a large tray, lay a piece of corrugated glass in the bottom. It can be obtained by carefully knocking the wooden frame off a glass washboard. If necessary, it can be reduced in size with a glass cutter. The large corrugations make it an easy matter to slip the finger nails under the edge of the prints to remove them. Small trays can be similarly fitted by using a piece of corrugated rubber matting, such as fastened on auto running boards. A washing in water occasionally will clean off old developer.—L. B. Robbins, Harwich, Mass.

Counterweights for Adjustable Haystack Roof

Concrete blocks with eyebolts cast in their ends make excellent counterweights for the adjustable haystack roof shown in the photo. The corners of the roof are cut out to fit around the posts, which serve as guides to hold the roof in place.

Concrete Blocks Attached to Adjustable Haystack Roof Make It Easy to Handle

A Power-Line Pole Straightener

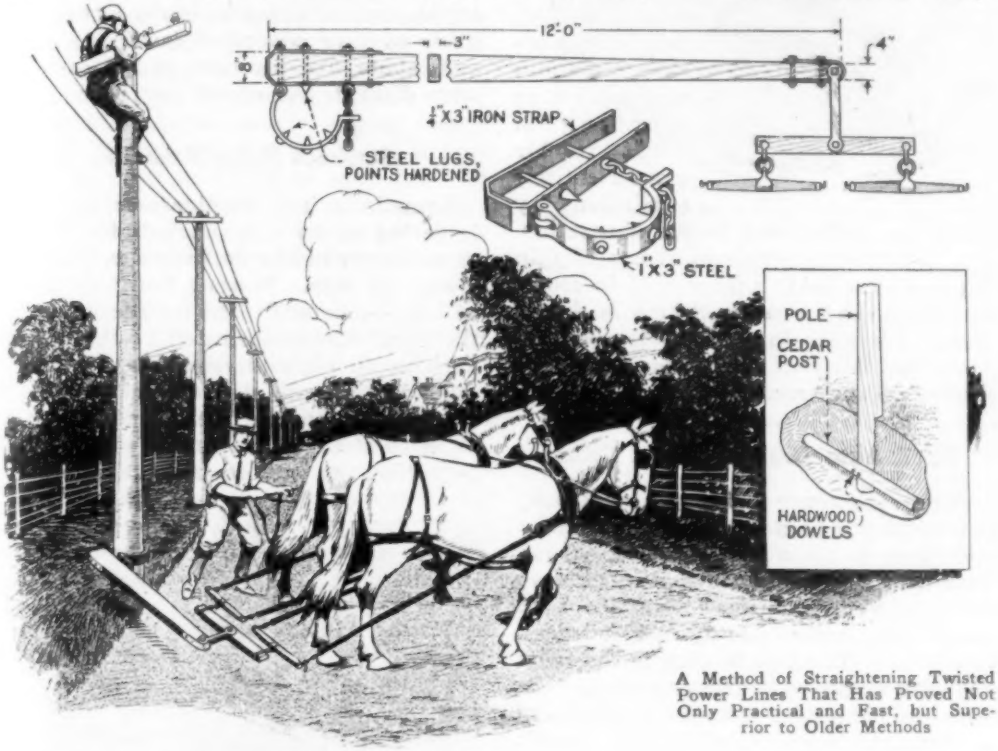
The very useful device shown in the illustration was made by a contractor who undertook to straighten up a five-mile power line, the poles of which had twisted, owing to too much tension on one side.

The device itself consists of a 12-ft. hickory or ash pole, 4 by 3 in. in size at the small end and 8 by 3 in. at the large. The latter carries the ¼ by 3-in. iron strap, shown in the drawing, and on one side is a pointed steel lug, forged on the end of a bolt. A 1 by 3-in. steel clamp is also fastened to the large end by means of an eyebolt, and fitted with lugs. The open end of the hinged clamp is slotted to take the links of a heavy logging chain, the end of which is fastened to the pole by an eyebolt. The device should be as well made as possible and only good, sound lumber should be used for the pole and its doubletree.

Application is very simple. The chain is unclasped and the straightener clamp placed around the line pole to be straightened, either at the ground level, or, if the wood is unsound there, about 6 in. above. A blow with a sledge sinks the lugs into the wood, and the chain is caught in the slot of the clamp. While this is being done, a man climbs the pole and loosens the wires from the insulators. While he stays there, the team is started and driven a few feet until the pole is straight.

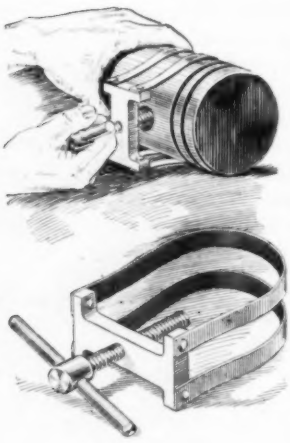
The after treatment, shown in the insert sketch, was found necessary every fourth pole, but this depends, to some extent, on the amount of twist. Some small lines can be straightened successfully by the strength of two men only, as the leverage of the straightener is sufficient for their pull. The best time for the job is in the early spring, just as the frost leaves the ground.

This method has proved far superior to the usual one of removing the crossarms and making new cuts for them in the pole. Not only is the pole weakened by this practice, but there is more danger of electrocution in the operation, if the line is live, and usually but few lines can be cut off for the length of time necessary.—Arthman N. Capron, Athelstan, Can.



A Method of Straightening Twisted Power Lines That Has Proved Not Only Practical and Fast, but Superior to Older Methods

Removing Piston Pins



In removing piston pins, many garage men resort to the customary bad habit of driving them out with a hammer and punch, which usually results in marring the piston and often in breaking it. This trouble can be entirely eliminated by using the tool shown in the illustration. It consists of a couple of straps of thin flat iron attached to a piece of ½-in. stock, as shown, and a screw, which is driven down by hand to force the piston pin out. By using this tool the piston cannot be injured in any way.

Small Auto Drains Flooded Cellar

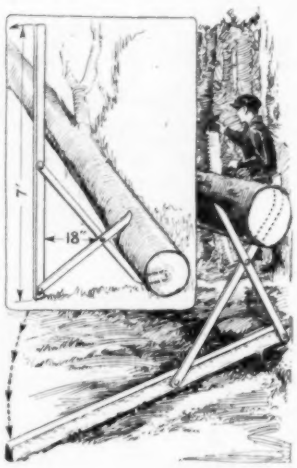
After each heavy spring rain we usually find from 2 to 10 in. of water in our cellar and there is no way of draining it out. Last spring we obtained a 1¼-in. rotary gear pump and connected the shaft of the pump to the hub of one of the rear wheels of our car. The pipe leading to the cellar kept the pump body from turning. The wheel of the auto was raised by means of a jack under the axle. The other wheels were blocked, and the arrangement pumped the water up at the rate of about two barrels per minute.—Geo. G. McVicker, North Bend, Nebr.

Carbide on Castings Shows Cracks

Most large shops use dismantled machinery as a supply for parts for new constructions, thus saving expense by avoiding pattern and casting costs. There is always the danger, however, that castings from old machinery will contain cracks, making them unsafe for reuse, and these cracks are often not evident. One large machine shop has a simple method of locating such faults. The castings are first washed in the usual cleaning fluid, to remove old grease and dirt. Then they are painted with slaked carbide, which is allowed to dry, leaving a white surface over the metal. If cracks exist, they will be revealed in a short time by black lines on the white surface. This is due to the grease in the cracks, which is drawn out and shows in sharp contrast to the white carbide. All axles and frame parts, which are to be subjected to strain, are treated in this manner as well as any other castings likely to have concealed flaws. As a result, about five per cent of the castings were discarded as unsafe last year.

Sawbuck Helps Raise Log

Sometimes it is troublesome to lift a large log up on a sawbuck, but with the buck shown in the drawing the task will always be easy. It has a 7-ft. base made of 2 by 4-in. stock. The long leg, bent at the upper end as indicated by the dotted lines, is an old cultivator beam and the other leg is made of two lengths of 1 by 4-in. wood. In use, the device is placed so as to straddle one end of the log and by pulling the base down, as indicated by the arrows, the log can be raised with little effort. This article is a correction of one published in the October, 1926, issue, where it was erroneously stated that both legs were made of 1 by 4-in. wood.—Luther Strosnider, Onaga, Kans.



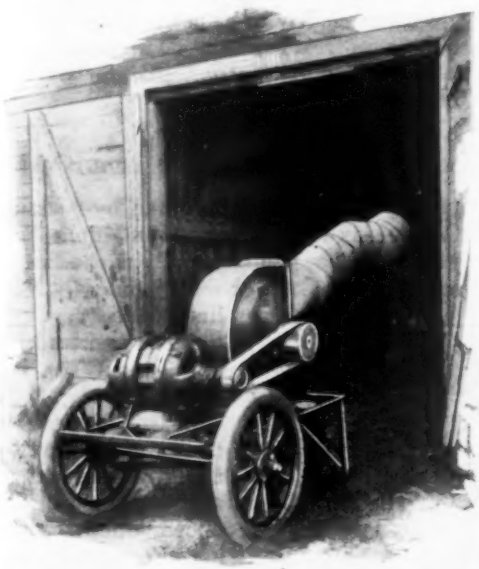
Fuel for Bee Smoker

One of the best and most easily obtainable materials for fuel in a bee or rodent smoker is made from gunny sacks. Strips, about 6 in. wide and 16 to 20 in. long, are cut and rolled to such size as to go into the chamber of the smoker. A cord is

tied around the rolls to hold them together until ready for use. Previous to putting them into the smoker, cut the cord and allow them to loosen. A little crankcase oil (used) may be applied to the sacking to produce more smoke and cause the cloth to burn better.

Forced Ventilation Prevents Shed Burn in Curing Tobacco

Shed burn, which is one of the troubles encountered by tobacco raisers, takes place soon after the plant is hung in the shed and before it is cured. This heating or burning usually occurs during heavy, damp weather when it is almost impossible to ventilate the shed properly. To eliminate the trouble, one tobacco raiser ventilated his shed by placing a 3-hp. electric motor, belted to a blower, on a two-wheeled truck which could be pulled through the passage of the shed. A flexible pipe was placed over the outlet of the blower so that air could be directed between the hangers in the different bents. On damp mornings the shed is ventilated from the center to the outside with this outfit. Temperature and humidity readings are taken every fifteen minutes. It



Portable Blower Provides Forced Ventilation for Tobacco Shed and Prevents Shed Burn

requires about two hours to ventilate a 125-ft. shed.—J. G. Wynn, Madison, Wis.

Large Turnbuckles Made from Old Truss Rods Prove Handy in Steel Shop

Old Truss Rods Make Useful Turnbuckles

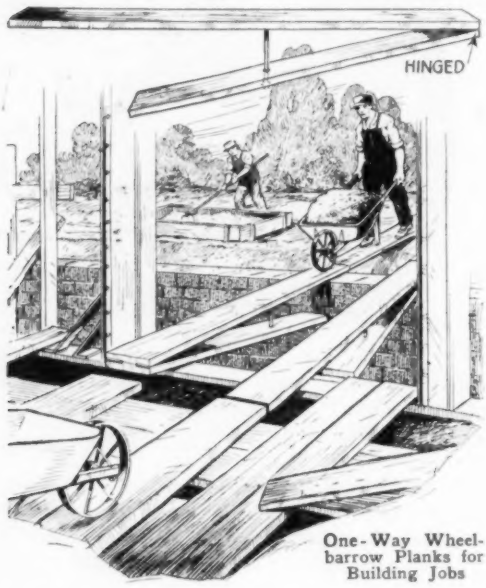
Time and labor are saved at a Denver steel shop in straightening heavy steel beams of various kinds by the use of the improvised turnbuckle shown in the photo. It is made from heavy truss rods, 2 ft. in length and bent at each end to hook over the flange of I-beams, channel or Z-irons. If these are close together, as in the photo, one or more of these turnbuckles are applied to the straight parts of the beams to hold them, while a jack is used to force any humps into place. The turnbuckles are easily tightened with a strong stick or rod, and as they are not seriously affected by heat, they may be set very close to the flame of a torch without risk of damaging them.—Jos. C. Coyle, Denver, Colo.

How to Paint Cement Surfaces

There are times when it is necessary to paint some cement surfaces as quickly as possible or just as soon as the cement has dried out. Although this ordinarily is too soon for painting, it can be done successfully in the following way: To 1 gal. of water add 12 oz. of sulphuric acid and brush this mixture over the wall, using an old brush. This will provide a surface that is free of any excess of lime and makes a good painting job possible. Do not let the mixture come in contact with skin or clothing.—L. H. Georger, Buffalo, New York.

One-Way Traffic for Wheelbarrows

Elevated planks for wheelbarrow tracks are a familiar sight during the erection of



One-Way Wheelbarrow Planks for Building Jobs

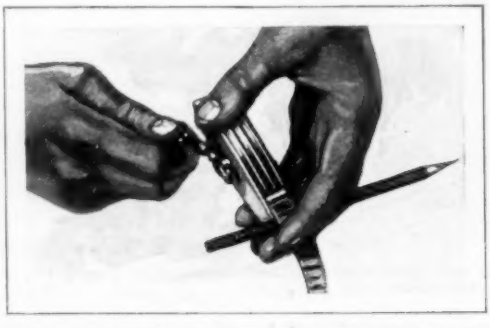
buildings. When a number of barrows are being used, two plank ways are essential, but it often happens that two men will start from opposite ends of the same plank, which means, of course, that one of them must back up to clear the way for the other. A building contractor in an eastern city, finding it of no avail to give orders that this practice should be strictly avoided, had a couple of runways made so that it was impossible to wheel a barrow both ways. Two planks, one a little longer than the other, are hinged together, and an eyebolt is screwed into the underside of the longer one, while a hole is bored in the other, large enough to clear the eye. A piece of rope is threaded through the eye and the hole, and both ends are knotted so the planks can be separated a convenient distance. These runways were used to bridge the gap between a temporary loading platform and the doorways in the building. Material dumped on the platform was carried inside in wheelbarrows, some doorways being used for going in and others for coming out, and the planks were placed accordingly. It will be seen that the weight of the bottom plank raises the hinged end of the top plank so that it is impossible to push the barrow over it, while, from the other end, a barrow can be wheeled in the ordinary way. As the workman proceeds with his barrow across the plank to the opposite end, that end is pressed down so there is no bump when the barrow leaves it. A nail on each side of the runway, at both ends, keeps it from working sideways and a short space is left between it and the planks laid on the surface at either end. By adjusting the knots, the plank can be made to rise to any suitable height.—Harry Moore, Montreal, Can.

Timing by Oil-Filled Priming Cup

When timing auto engines having priming cups, the cup in the front cylinder should be partly opened and filled with fairly heavy oil. When the piston is coming up on the compression stroke, air bubbles pass through the oil in the cup and agitate it sufficiently to be easily seen. When the piston reaches top dead center, the bubbling suddenly stops.—E. T. Gunderson, Jr., Humboldt, Iowa.

How to Prevent Tape Line from Kinking

Many tape lines are ruined by twisting the tape as it is being wound up. This is likely to happen especially if the line is wound up in dark or windy places. New lines also have a tendency to kink or curl quickly on becoming slightly damp. This trouble can be prevented by using a lead pencil as shown in the photo, when returning the tape to the case. It will wind rapidly without the least danger of kinking.



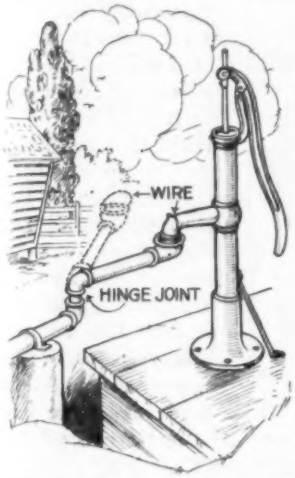
Slip a Pencil under the Tape Line While Winding It to Prevent It from Kinking

Kink for Stenographers

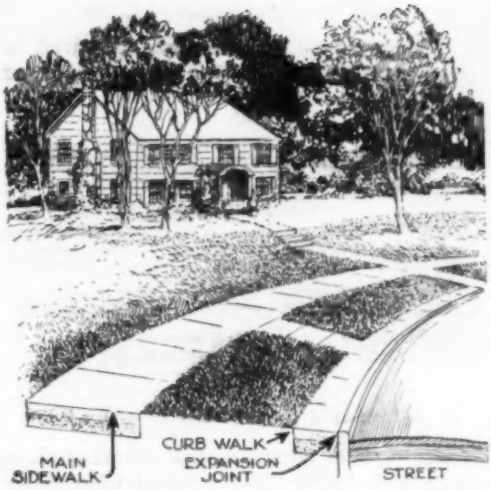
Sometimes it is necessary for a stenographer to use a typewriter when the keys are so cold that the fingers become numb. This can easily be overcome by raising the typewriter on some books, about 1 in., and placing a lighted electric lamp under the keyboard. A dark cloth can be wrapped around the bulb to prevent glare. The keys will be kept just warm enough to permit typing with comfort.

Hinged Joint in Pump-Supply Pipe

On most farms the pipe connecting the windmill pump with the water tank is attached to the spout by means of a cast-iron bowl with a wire bail. This is a satisfactory arrangement as long as the mill is employed merely to pump water into the tank, but when it is necessary to remove the pipe so that pails or cans may be filled, it means a waste of time. To simplify the attachment and removal of the pipe, one farmer conceived the idea of placing the latter on a permanent support and providing a hinged joint at the point indicated in the drawing. This joint is made by putting two elbows and a short nipple in the pipe line, about 3 ft. from the pump, and allows the bowl to be swung toward or away from the pump. The bail holds the bowl securely beneath the spout when in place. This improvement is especially desirable where women or children have to fill the water pail at the pump.



¶It is almost impossible to paint a wall in a satisfactory manner unless properly sized; a good size can be made by thinning varnish with gasoline. The first coat should be dry before applying the next.



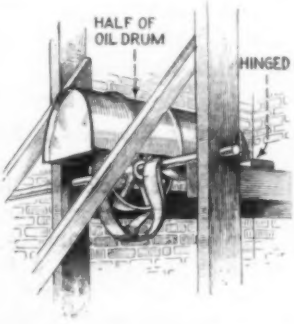
Protecting Grass Plots near Curbs by Narrow Walk

Narrow Curb Walks Protect Grass

The problem of keeping grass in parkways between curbs and sidewalks from being trampled down by pedestrian traffic can be solved by laying narrow concrete walks along the curbs. These walks are made about 2 ft. wide and 5 in. thick, and are separated from the curbs by bituminous expansion joints, as shown in the drawing. They are connected to the main sidewalks by crossings, about 50 ft. apart, which provide means of reaching the former without stepping on the grass.

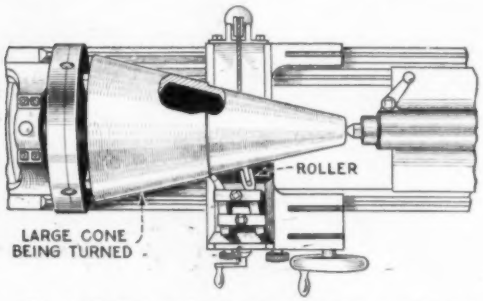
Protecting Belts Exposed to the Weather

It is often necessary to run belting outdoors, where it may be injured by the weather if not covered. A simple and effective cover can be made from an ordinary sheet-metal drum, split open with an acetylene torch, and set over the belt as shown in the drawing. Two strap hinges are attached to the end of the cover so that it can be raised and turned back when the belt is to be mounted.



How to Turn a Large Cone

A large cast-iron cone was required in the blacksmith shop, for the purpose of enlarging and rounding up different sizes of forged rings. The method of turning the cone is shown in the drawing. A short portion at the small end was first turned by means of the compound rest. The cross-slide screw was then removed and a holder with a roller was placed in the tool rest along with the cutting tool, and a rope and weight were attached to the cross slide to keep the roller in contact with the surface of the cone. When the lateral power feed was engaged, the tool was forced out gradually by the action of the roller on the cone surface.—Jas. H. Rodgers, Toronto, Ontario, Canada.



Simple Method of Turning Large Cone on a Lathe

Removing Film-Pack Tabs with Scissors

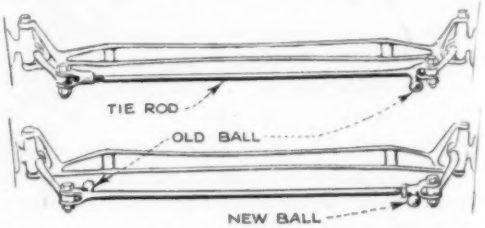
Any film pack will leak occasionally, and the film that gets fogged is invariably the one that the photographer was most anxious to obtain. I had a number of valuable negatives ruined in this way, until I decided to determine the cause and find a remedy if possible. A careful examination showed that the films are fogged by the operation of tearing off the cover tabs after the paper has been pulled out of the pack to bring the next unexposed film into position. As a remedy I experimented by refraining from tearing off the paper tabs. Instead of tearing them off I provided myself with a pair of blunt-pointed scissors. After an exposure is made, the paper tab is pulled out as before, but not torn off. Frequently I exposed the whole pack letting the paper tabs hang out until the last photo had been taken. Then, the tabs are carefully cut off with the scissors. Of course, if the whole pack is not to be used at once, it is as easy to cut them singly.—John Edwin Hoag, Los Angeles, Calif.

FREE

THERE is nothing more useful in shop or drafting room than a table of decimal equivalents. We have prepared a stout, well-printed table, 16½ in. wide and 23 in. long, suitable for the wall of office or shop, and one or more copies of this will be mailed free to anyone who desires it. This is offered you merely as a service. Send us your name and address, and your copy will be sent at once, carefully wrapped and postpaid. Address Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

Repair for Ford Tie-Rods

Old-model Fords were fitted with front-wheel tie-rods having a ball forged on the right end, while an adjustable nut was provided at the other end. The ball often wears out first, and it is then customary to get a new tie-rod, although this is otherwise in good condition. To avoid this unnecessary expenditure a simple repair of the kind shown in the illustration can be made. Turn the rod end for end and replace the adjustable yoke with the new-style yoke and removable ball. This will leave the old ball on the left end of the tie-rod where it will not interfere with steering.—E. T. Gunderson, Jr., Humboldt, Iowa.



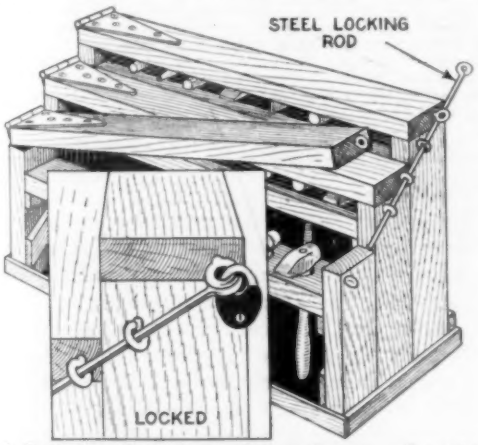
Repair on Ford Tie-Rod Eliminates Expense of Purchasing a New One

Using Tongueless Cultivator

A tongueless cultivator is a very awkward implement to handle when one horse of the team walks faster than the other or when one horse stops to take a bite of corn. To remedy the tendency of the cultivator to line down or run sideways in such cases, the inside two tugs of the team may be crossed, hitching the tug from each horse across to one end of the singletree of the other horse.—Geo. G. McVicker, North Bend, Nebr.

Lock for Blacksmiths' Tool Rack

A tool rack that can be locked is often desirable to a blacksmith. That shown consists of a number of heavy shelves in a frame and is easily made. Suitable holes in these allow the tools to be suspended with the heads resting on the shelves. A plank or heavy board is hinged to the framework over each shelf as indicated. In the frame as well as in the ends of the



A Padlock, a Steel Rod and Some Screweyes Securely Lock This Tool Rack

hinged planks, heavy screweyes are driven, so that a long steel rod can be passed through all of them. One end is bent to form an eye, and a padlock is used in the topmost screweye and the loop of the rod, to prevent removal of the latter, as shown in the detail.

Attach a Water Hose to the Driveway Brush to Help Clean the Walk or Driveway

Hose Attached to Driveway Brush Aids in Cleaning Cement Walks

A wide brush, of the type called a "driveway brush," is often used for cleaning floors and walks. It is a good plan to tape or wire a garden hose to the handle of the brush, with a moderate stream of water directed on the bristles. The user can then scrub without stopping and the brush will be kept supplied with enough water to wash away the dirt. Another advantage is that the water prevents the bristles from breaking as they often do when used dry.

Driving Nails in Hardwood

To facilitate driving nails in hardwood, first drill a hole in the end of your hammer handle, fill it with melted beeswax or paraffin and insert each nail in the wax before you drive it into the wood. This method is also good for driving nails that have become slightly rusty and will enable you to drive screws into wood quickly and with much less effort than an untreated screw requires.—Mrs. Russell Durham, Belton, Tex.

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages and also to avoid the appearance of doing so, we are obliged to omit the name of the maker or the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

Is This Your Home?

Copyright, Architects' Small House Service Bureau

Plan No. 4A5

QUESTIONS regarding home building addressed to this magazine will be answered by The Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and endorsed by the United States department of commerce. Inclose 10c and self-addressed envelope. Blueprints, specifications and material list for the house shown here may be obtained at nominal cost. Inclose self-addressed stamped envelope for reply. If further information is desired, send 5c and stamped envelope for a 24-page booklet explaining how the Small House Service Bureau functions and showing 12 sample plans. A new booklet, entitled "Fifty Ways to Lower Home Building Costs," illustrated by ten bureau houses actually lived in, and showing how as much as $1,000 can be saved on a home, may be obtained for 20 cents.

THE house illustrated here shows how the dignified colonial style can be satisfactorily applied to a modern home of small dimensions.

One of the features is a comfortably large living room dominated by a brick fireplace with adjoining bookcase of the same height as the mantel shelf and with panel doors.

Six or seven people can be served at the extension dining table, with drop leaf, built into one end of the large well-planned kitchen. One of the seats has a hinged cover to give additional storage space under it. There are two long deep drawers under the seat built against the bathroom wall and these are accessible from the bathroom. Two good-sized bedrooms and bath occupy practically one-half the floor space. This house can be built at a reasonable cost because of its straightforward plan and lack of features which require extras in the way of labor, millwork, etc. Its charm lies in its simplicity and adherence to colonial style.

A porch like the one on this house is always welcome. It measures eight feet wide by twenty-nine feet long. Another feature is the unusual closet space. Besides the fine kitchen equipment of cupboards and a closet in each bedroom, there is a coat closet in the entrance vestibule, a linen closet in the hall and abundant storage space on the second floor.

The house contains four rooms and bath on the first floor—two bedrooms, a living room, and combination kitchen and dining room. The second-floor bedroom has a closet and cross ventilation, as indicated in the plan. There is also a large storage room and space to finish off another bedroom if desired. The place calls for a full basement.

Colonial tradition is faithfully followed in this house, for it is of frame construction with brick base course, brick chimney, shingle roof, and exterior carried out in wide bevel siding. To keep the spirit of the style the body of the house has been painted white, the roof and blinds green.